

# **USDA Forest Service National Rappel Operations Guide**



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National Rappel Operations Guide**

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## **USDA Forest Service National Rappel Operations Guide**

The US Forest Service National Rappel Working Team (NRWT) and the National Rappel Operations Subcommittee (ROS) have developed this Guide for agency employees conducting Forest Service helicopter rappel operations.

The Interagency Helicopter Rappel Operations Guide (IHRG) remains the basic guidance for US Forest Service helicopter rappel operations, and this guide is based on and augments the IHRG. However, the IHRG allows for the issuance of agency-specific guidance, provided that when such guidance differs from that contained in the IHRG, agencies explain and document the deviation, which has been done here. Therefore, employees conducting US Forest Service helicopter rappel operations should first consult this guide, which takes into account the equipment, procedures, and standards specific to the Forest Service.

Refer to Appendix M, Significant Revisions, for specific additions or alterations that depart, in this Guide, from the content and standards of the IHRG.



## **US FOREST SERVICE HELICOPTER RAPPEL MISSION STATEMENT**

The US Forest Service National Helicopter Rappel Program's primary mission is initial attack. Rappel crews may be utilized for large fire support, all hazard incident operations, and resource management objectives.





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## Chapter 1 – Introduction

### I. Objective

This Guide provides standards for the administration of all rappel units regarding personnel qualifications, organization, certification, standardization, training, equipment, and operating procedures. Managers, specialists, and technicians shall use this Guide in planning, administering, and conducting rappel and cargo letdown operations.

### II. Scope

The procedures contained in this Guide apply to rappel operations conducted by the Forest Service rappel bases. The level of standardization is determined by the Forest Service National Rappel Working Team (NRWT).

### III. Policy

All Forest Service Rappel Bases have similar administrative technical requirements for rappel and cargo letdown operations. Operations and procedures shall comply with agency policy, procurement documents, this Operating Guide, and the Interagency Helicopter Rappel Guide (IHRG), upon which this Operating Guide is based. Because this Guide is specific to the Forest Service with respect to equipment, agency procedures, and agency standards, and, in some provisions, is more restrictive than the IHRG (as noted), employees should consult and rely upon this Guide first.

### IV. Authority

This Guide has been submitted by the NRWT to the National Rappel Steering Committee (NRSC) for review and concurrence.

This Guide has been approved by the Deputy Chief of State and Private Forestry. Host regions and forests are responsible for ensuring rappel bases, spotters, and rappellers under their management meet national standards for rappel training and operations.

Line officers shall ensure that only qualified personnel supervise and administer rappel operations. Rappel Base Managers shall ensure operational safety and compliance with standards, equipment, and procedures.

### V. Standardization of Equipment & Procedures

The total mobility and the interchange of personnel and equipment between units (“boosting”) dictates that personnel qualifications and training, equipment, rappel and cargo letdown delivery methods, and operating procedures must be uniform and standardized. This Guide lists standardized training, equipment, and procedures for uniform service-wide application. The Washington Office will have final approval for new equipment and procedures before they are adopted for Service-wide use.

**VI. Review and Revision**

Users are encouraged to recommend changes to this document through their respective rappel base manager. The Forest Service NRWT will conduct a general review annually. Appropriate changes will be recommended by the Team to the NRSC and to the Deputy Chief of State and Private Forestry for approval. Revisions will be distributed by the Forest Service National Aviation Office.

**VII. Disclaimer**

The use of trade, firm, product, company, or corporation names is for information and convenience purposes. Such use does not constitute an official evaluation, conclusion, recommendation, endorsement, or appraisal of any product or source to the exclusion of others that may also be suitable.

## Chapter 2 – Administration

### I. Organization, Personnel, Staffing, and Standards

To maintain high standards in equipment, operating procedures, organization, and safety, operational supervision by competent, well-qualified personnel fully funded and supported by a properly staffed and trained organization is essential.

#### A. Unit Organization

Rappel crews shall be managed and supervised by the local unit. This supervision should be provided from a Forest level fire manager or aviation officer rather than from a district level manager.

Staff each rappel base to effectively supervise the base's activities. The staff at permanent bases shall include one base manager, and one or more persons to oversee the following functional areas: operations, equipment, and training.

Structure the base organization to provide an adequate ratio of managers and assistant managers to squad leaders, and squad leaders to rappellers. Each unit requires a minimum of one squad leader for every five rappellers. Depending on the size, workloads, and responsibility of each unit, establish additional positions to ensure that all areas of responsibility receive the necessary supervision. Some or all of these positions may require full-time employees to obtain the skill levels necessary to accomplish the job.

The number of qualified spotters should be sufficient to staff the available aircraft fleet. Two spotters per rappel helicopter is the recommended minimum with three or more as the desired target. Organization structures should also strive to provide a clear and attainable career ladder whenever possible.

#### B. Overhead Personnel Staffing Requirements

National Standard Position Descriptions for helicopter positions are available and should be used by all rappel units. While organizational structures may vary among rappel bases due to size and complexity, each organizational unit should provide qualified personnel to manage a number of functional areas. The following describes these key functional areas and general responsibilities:

1. Rappel Base Manager: The rappel base manager must have administrative and rappel experience and be thoroughly familiar with aircraft operation and all phases of helicopter rappelling. This individual is responsible for all administrative, facilities, preparedness, and fire operations at the rappel base.
2. Operations Manager: The operations manager maintains standardized procedures in rappel operations, organizes project work, and keeps records for

all rappeller activities. In some organizations, this individual also may serve as training manager and/or equipment manager. The individual responsible for this position or functional area reports to the base manager. The operations manager must be an experienced rappel spotter and must remain an active rappel spotter.

3. Training Manager: Larger organizations may need a training manager responsible for the various training activities of a rappel unit. In most organizations, the training manager reports to base manager. This individual must be an experienced rappel spotter and must remain an active spotter. Some bases may combine this position with the operations manager position.
4. Equipment Manager: The equipment manager is responsible for maintaining helicopter rappel related equipment and reporting deficiencies. Depending on the complexity of the aviation operation, not every base will require a dedicated equipment manager and these responsibilities may be assigned to another functional area manager. This individual must be an experienced and active rappel spotter. The equipment manager will:
  - a. Provide technical assistance to the base manager
  - b. Maintain base supplies and rappel equipment
  - c. Supervise equipment repair and manufacture as applicable
  - d. Assist the Missoula Technology and Development Center (MTDC) in testing and development of rappel equipment as requested
5. Assistant Manager: Each functional area (operations, training, and equipment) may have one or more assistant managers assigned. Assistants report directly to the functional area manager and assist in the overall management of the function.
6. Clerical Personnel: Each organization, depending upon administrative complexity and need, should have a clerical assistant assigned to assist the base manager with administrative responsibilities at the base.

### C. Crew Organization

By 2014, the crew size shall be a minimum of 15 persons per rappel helicopter. An 18-person crew size is recommended to increase IA capability, provide additional leadership to the crew, and add greater flexibility that will allow for off-crew training opportunities to advance operational and aviation qualifications.

Rappel module size may increase above the minimum or recommended levels depending on funding, size of facilities, local management, and national needs. However, rappel crew modules shall adhere to the ICS span of control for supervision which ranges from three to seven subordinates to each supervisor. Because, span of control is influenced by the size, complexity, and specific hazards of the incident or operation, a ratio of one supervisor/leader to five subordinates is most often recommended and should be the target for each rappel crew.

The tables below show the 15-person minimum module configuration and the recommended (18-person) and suggested (21-person) larger standard crew organizations. These module configurations are for single helicopter rappel crews and were developed with the target span of control ratio in mind.

**Standard 15-Person Crew Module**

<b>Position Description</b>	<b>Grade</b>	<b>Minimum Tours</b>	<b>Number of Positions</b>
Helitack Manager FS1920	GS-09	26/0	1
Helitack Asst. Mgr. FS1918/FS1919	GS-07/GS-08	18/8 Minimum	1
Squad Leader FS1986/FS1987	GS-06/GS-07	13/13 Minimum	2
Senior Firefighter FS0199/FS0200	GS-04/GS-05	13/13 Minimum	4
Apprentice	GS-04/GS-05	13/13 Minimum	3
Firefighter	GS-04	Temporary	4

**TABLE 2-1**

**Standard 18-Person Crew Module**

<b>Position Description</b>	<b>Grade</b>	<b>Minimum Tours</b>	<b>Number of Positions</b>
Helitack Manager FS1920	GS-09	26/0	1
Helitack Asst. Mgr. FS1918/FS1919	GS-07/GS-08	18/8 Minimum	1
Squad Leader FS1986/FS1987	GS-06/GS-07	13/13 Minimum	3
Senior Firefighter FS0199/FS0200	GS-04/GS-05	13/13 Minimum	4
Apprentice	GS-04/GS-05	13/13 Minimum	3
Firefighter	GS-04	Temporary	6

**TABLE 2-2****Suggested 21-Person Crew Module**

<b>Position Description</b>	<b>Grade</b>	<b>Minimum Tours</b>	<b>Number of Positions</b>
Helitack Manager FS1920	GS-09	26/0	1
Helitack Asst. Mgr. FS1918/FS1919	GS-07/GS-08	18/8 Minimum	2
Squad Leader FS1986/FS1987	GS-06/GS-07	13/13 Minimum	3
Senior Firefighter FS0199/FS0200	GS-04/GS-05	13/13 Minimum	4
Apprentice	GS-04/GS-05	13/13 Minimum	3
Firefighter	GS-04	Temporary	8

**TABLE 2-3**

In each of the crew configurations illustrated in the tables above, the crew leadership positions (Helitack Manager, Helitack Assistant Manager, and Squad Leaders) should all be filled as required or recommended so as to achieve the appropriate span of control. The ratio of senior firefighter, apprentice, and temporary firefighter positions may be flexed to accommodate experience, skills, and developmental opportunities. But the number of the firefighter positions in total should be achieved so as to provide adequate crew capability for IA purposes.

Any base that hosts two or more rappel helicopters or has a complex aviation operation with multiple aircraft should consider filling an Airbase Manager (GS-11 26/0) position. At bases that host two or more helicopters, the operations, equipment, and training functional areas should be managed by separate individuals.



## Chapter 3 – Rappel Position Standards

**NOTE: The certifying official at each level may require additional training for pilot, rappeller, spotter, or check spotter.**

### I. Rappel Pilot Training

#### A. Requirements

Pilots must meet the appropriate requirements of the contracting document and shall receive training on rappel operations and equipment as listed below. Pilots needing initial rappel certification should attend a consolidated training session. In addition, the pilot will be evaluated and approved by an Agency Helicopter Inspector Pilot for longline, rappel, and cargo letdown in accordance with the Interagency Helicopter Practical Test Standards.

#### B. Pilot Rappel Training Syllabus

1. Rappel crew specific Crew Resource Management training
2. Orientation of unit and agency fire suppression organization, dispatch organization, and communications
3. Briefing and familiarization on rappel anchor and hard-point for specific model including inspection procedures
4. Briefing and demonstration of rappel equipment use and inspection to include harness, descent device, rope, accessories, and PPE
5. Seating arrangement for rappellers and spotters
6. Standard IA configuration and deployment procedures
7. Cargo placement, loading, securing, rigging, inspection, and letdown procedures
8. Helicopter mock-up training to include cargo letdown, rappel sequence, rappel emergency procedures simulation and helicopter emergency procedures
9. Expectations for pre-rappel mission briefing
10. Risk Management procedures and analysis process
11. Review rappel site selection criteria including:

- a. Personnel
  - b. Safety zones
  - c. Fire behavior
  - d. emergency fly away site, helicopter clearance, ability to land rather than rappel
12. Pilot and spotter protocols and responsibility to cancel any mission deemed unsafe or too high risk

### **C. Approval**

1. Pilot's final approval for rappel operations will be based upon:
  - a. Completion of spotter provided briefing and training
  - b. Demonstrate the ability to pilot the helicopter during a series of rappels and cargo letdown operations. Pilot's focus will be on spotter direction, aircraft health and stability, not on vertical reference placement of the rappellers
  - c. Demonstrated ability to coordinate with rappel spotter
  - d. Demonstrated knowledge of rappel emergency procedures during emergency procedures simulation and aircraft emergency procedures effect on rappel operations
  - e. Demonstrated ability to perform Weight and Balance computations (including Center of Gravity) for rappel configuration

### **D. Pilot Proficiency**

To maintain currency, each pilot must fly at least one error-free helicopter rappel sequence within the preceding 14 days. If proficiency is lost, an error-free mockup and helicopter rappel sequence flight must be completed prior to any operational rappel. If two proficiency rappel periods pass (28 days), the spotter with the concurrence of the Helicopter Inspector Pilot will ensure the pilot is capable of deploying rappellers through the use of mockups and proficiency rappel flights. If the spotter has concerns that the pilot is not capable; the spotter must request a HIP to conduct another check ride. It shall be the responsibility of the local program manager to ensure proficiency requirements are met and properly documented on a unit log or equivalent.

## II. Rappel Check Spotter

**NOTE:** Check spotters may suspend spotter or rappeller qualifications pending review of the next higher certifying level. Revocations of spotter/rappeller qualification will be determined at the appropriate Regional or National Aviation office.

### A. Rappel Check Spotter Duties

1. Initial spotter evaluation and certification
2. Monitor and provide oversight for rappel and spotter training
3. Monitor operations for standardization purposes

### B. Rappel Check Spotter Position Prerequisites

1. Must have been a qualified spotter for three (3) seasons
2. Must have demonstrated ability as an instructor and assisted in training at a minimum of two (2) consolidated training sessions of which at least one is an initial rappeller training session

### C. Rappel Check Spotter Designation

Approval of Check Spotters shall be designated annually by their Regional Helicopter Operations Specialist with concurrence from the National Rappel Specialist.

### D. Rappel Check Spotter Proficiency

To maintain currency, each check spotter must maintain currency/proficiency as a rappel spotter (see section III, E, of this chapter).

### E. Rappel Check Spotter Annual Certification

Each check spotter must be certified as a rappel spotter (see section III, F, of this chapter).

## III. Rappel Spotter

### A. Rappel Spotter Duties

1. Safely deploy rappellers according to policy outlined in this Guide
2. Ensure only standard procedures and equipment found in this Guide are used and followed

3. Provide initial and recurrent training and certifications for rappellers. Provide training in accordance with the Helicopter Rappel Spotter Qualification Record.

## **B. Rappel Spotter Prerequisites**

1. Trainee Rappel Spotter Prerequisites:
  - a. One fire season (90 days) on a helicopter rappel crew
  - b. Meets the requirements of and is designated as a Helicopter Manager Trainee
  - c. Completion of 20 live rappels, with four of those being operational
  - d. Completion of National Incident Management System (NIMS) IS 700
  - e. Other recommended training, Basic Supervision for First Line Supervisors, M-410 or equivalent, Contracting Officer Representative Level I, Risk Awareness (A-205) and ride along on rappel and or cargo missions
2. Rappel Spotter Certification Prerequisites:
  - a. Meet the training, experience, and certification requirements for a helicopter manager as stated in agency policy
  - b. Currently qualified Incident Commander Type 4
  - c. Has assisted in instruction of rappel training
  - d. For a new program initiated within the agency, it will be the responsibility of the base manager with concurrence of a check spotter to designate initial spotter trainees
  - e. Completion of Forest Service Certified CRM course in accordance with FSH 5709.16, Ch.20, 21.1, 8 and 21.6

## **C. Rappel Spotter Training**

Complete Helicopter Rappel Spotter Training Qualification Record and pass a final evaluation administered by a qualified check spotter.

## **D. Rappel Spotter Initial Certification**

The spotter trainee shall recertify as a rappeller, complete all training requirements as a spotter, be recommended for certification by a check spotter, reviewed by the Regional Helicopter Operations Specialist and National Rappel Specialist, and certified by the local unit official.

## **E. Rappel Spotter Annual Certification**

Annual spotter certification requires training and demonstration of competency.

1. Each year, to re-qualify, a spotter must:
  - a. Recertify as a rappeller

- b. Meet fitness standards and desired fitness goals as outlined for rappeller candidates
- c. Attend a Forest Service Certified CRM refresher course related to rappel operations annually (1.5 hour minimum)
- d. Attend and/or participate as an instructor at annual consolidated helicopter rappel training.
- e. Complete deployment of three (3) typically configured loads of Rappellers with at least one (1) successful deployment of Rappellers and cargo from helicopter to the satisfaction of a qualified check spotter. Typical terrain and a full complement of Initial Attack cargo shall be utilized for at least one (1) of the three (3) loads.
- f. A spotter will have no more than two opportunities to recertify annually. After the second failed check ride a spotter will not be an active spotter for that operational season.

#### **F. Rappel Spotter Proficiency**

To maintain currency, each spotter shall make at least one error-free helicopter or simulator spot in any 14 consecutive days. If a simulator spot is used to maintain proficiency during any 14-day period, a helicopter spot must be completed during the next 14-day cycle. If proficiency is lost, an error-free simulator spot or mockup and helicopter proficiency spot must be completed prior to any operational spots. If two proficiency spot periods pass (28 days), a qualified and current spotter will ensure the spotter is capable of performing the spot through the use of mockups or training spots.

#### **G. Rappel Spotter Lapsed Annual Certification – Recertification Requirements**

If a spotter has lost their annual certification for a time period of one (1) operational season (skipped one season of certification), the individual shall complete rappel spotter annual certification requirements (see section 3, III, E above) and will operate under direct supervision of a qualified spotter for a time period determined by a check spotter. A check spotter may use past performance and experience as a means to determine an acceptable time period.

After performing under direct supervision for the prescribed time period, a formal check ride will be conducted utilizing the spotter training handbook final sign-off sheet. It is recommended that the check ride occur on an operational rappel. If the individual fails the check ride, they will be required to begin spotter training as an initial spotter candidate.

If a previously qualified spotter has not been certified in the two (2) previous operational seasons the individual will begin spotter training as a new spotter candidate in accordance with section 3, III, C and D above.

## IV. Rappeller

### A. Rappeller Prerequisites

For consideration as a Rappeller, Rappeller candidate must meet the requirements for a Helicopter Crewmember Trainee as stated in Forest Service policy.

### B. Rappeller Initial Training

All components of the rappel training must be completed in accordance with the Rappeller Training Syllabus to include the following:

1. Ground Training: All rappeller trainees will complete ground training to include both ground and elevated platform training. This training must be performed in accordance with Appendix A of this Guide, Rappeller Training Syllabus.
2. Helicopter Mock-Up: Trainee will demonstrate a rappel sequence and emergency procedures from a helicopter on the ground as initiated by the spotter, until proficiency is demonstrated from all seating positions.
3. Helicopter Rappels: Rappeller shall complete a minimum of 8 live helicopter rappels without procedural error. These rappels must be in accordance with Appendix A of this Guide.

### C. Rappeller Annual Certification

To be certified as a rappeller an individual who has qualified the previous year will:

1. Attend recommended Agency or Geographic Area basic helicopter safety refresher.
2. Participate in an equipment and procedures review.
3. Demonstrate knowledge of rappel principles.
4. Complete the performance based requirements outlined in part D., Rappeller Performance-Based Requirements, below.
5. A rappeller will perform helicopter mock-up rappels and re-entry procedures as initiated by the spotter, until proficiency is demonstrated from all seating positions.
6. Complete three helicopter rappels without procedural error. Typical terrain shall be utilized for at least one of the three rappels.

7. Identify emergency situations and perform corrective actions without procedural error.

#### **D. Rappeller Performance-Based Requirements**

To be qualified as a rappeller an individual must perform a number of performance-based rappel procedures from an elevated platform with the full weight of rope (or equivalent) suspended below the rappeller:

1. The performance-based standards are as follows:
  - a. Perform three (3) simulator exits
  - b. Perform three (3) simulator re-entries from the pre-rappel position on the skid/step
  - c. Untie three (3) knots during simulator rappels
  - d. Complete three (3) emergency tie-off procedures (ETO)

#### **E. Rappeller Proficiency**

To maintain currency, each rappeller shall make at least one (1) error-free helicopter or simulator rappel in any 14 consecutive days. If a simulator is used to maintain proficiency during any 14-day period, a helicopter rappel must be completed during the next 14-day cycle. If proficiency is lost, an error-free simulator rappel or mockup and helicopter proficiency rappel must be completed prior to any operational rappels. If two (2) proficiency rappel periods pass (28 days), a qualified and current spotter will ensure the rappeller is capable of performing the rappel through the use of mockups and training rappels.

#### **F. Rappeller Mid-Season Error**

During the operational season if a rappeller commits an error during a live rappel (proficiency or operational) the spotter will determine the severity of the error and follow one of the courses of action listed below. See Appendix A, Rappeller Training Syllabus, lesson one for a full description of errors and penalties.

1. Mid-Season Major: If a rappeller commits a major error during a live rappel (proficiency/operational) the spotter will not allow the rappeller to continue. Upon return to base the rappeller will be debriefed and placed in loss-of-proficiency status. The major error must be reviewed by the rappeller's supervisor and a Check Spotter. The rappeller may regain operational status once proficiency performance elements are met (this may include additional live rappels).

Based upon the rappeller's demonstrated ability and record of errors, a check spotter may suspend rappeller from further rappel operations (see note box, Chapter 3, II). Once suspended, the rappeller will not be eligible for reinstatement during that calendar year and may only regain certification by attending recertification training in a subsequent year.

2. Mid-Season Minor: Occasional minor errors should be handled at the crew organizational level (spotter/direct supervisor) and only elevated to a check spotter if it becomes habitual and cannot be rectified otherwise.

#### **G. Rappeller Lapsed Annual Certification – Recertification Requirements**

If a rappeller has lost their annual certification for no more than a time period of two (2) consecutive operational seasons, an individual may recertify as a rappeller by attending a consolidating rappel training session and completing the requirements for rappeller annual certification (see section 3, IV, C above).

If a recertifying rappeller cannot consistently demonstrate proficiency through their performance during the rappeller annual certification training, the individual may only be recertified by successful completion of rappeller initial training requirements (see section 3, IV, B above).

If three or more consecutive seasons elapse since their last certification as a rappeller, the individual shall have to complete rappeller initial training requirements at a consolidated rappel training session.

If a formerly certified rappeller has never attended a consolidated rappel training session, no matter the number of seasons that have elapsed, the individual shall be required to complete rappeller initial training at a consolidated rappel training session.

#### **H. Rappeller Fitness Standards**

All rappellers must meet Office of Personnel Management Qualification Standards Handbook for positions under the General Schedule. In addition, these individuals must meet the following, annually:

1. Current requirements for medical standards: the Health Screening Questionnaire (HSQ)
2. Rappeller candidates must pass the “Work Capacity Test” at the arduous level

#### **I. Desired Fitness Goals**

Because of the link between fitness and work performance, rappellers must maintain a high fitness level and be able to perform all physical tasks that are necessary to accomplish the rappel and firefighting mission. Physical fitness training to build strength and cardiovascular endurance should be a core value and a component of pre-season and seasonal training.

1. It is recommended that annually, all rappellers perform the fitness test listed below as a way to measure cardio-respiratory endurance and muscular fitness.



These fitness goals come direct from the Forest Service Fire and Aviation Qualification Guide (FSFAQG), Chapter 4.

- a. 1.5-mile run in 10 minutes 35 seconds or less
  - b. 40 sit-ups in sixty seconds
  - c. 25 pushups in sixty seconds
  - d. Chin-ups
    - i. Four chin-ups (>170 lbs. body weight)
    - ii. Five chin-ups (135-170 lbs. body weight)
    - iii. Six chin-ups (110-134 lbs. body weight)
    - iv. Seven chin-ups (<110 lbs. body weight)
2. To prepare and measure an individual's ability to carry a typical load, it is recommended that a 3-mile, level terrain, pack-out with a minimum of 85 lbs. in 90 minutes or less be conducted prior to operational activities each year.



## Chapter 4 – Rappel and Cargo Letdown Equipment

### I. Equipment Standards

All equipment used in rappel operations will be approved by the National Rappel Working Team. All equipment will be monitored during use for wear and stress related damage. Shortening the service life or removal from service of a special component may be done, as necessary, in order to maintain an adequate margin of safety in the program.

Any equipment irregularities must be reported in accordance with Appendix E, Rappel Equipment Irregularity Reporting Protocols.

All rappel equipment that is removed from service (retired) must be destroyed to the point that it can no longer be utilized for its intended purpose. All rappel equipment that has been retired remains government property and should be handled according to policy.

All proposed rappel aircraft shall be subject to a screening and evaluation process, to be completed by the Helicopter Screening and Evaluation Board (HSEB)

**NOTE: Approved rappel equipment is identified in the MTDC Wildland Fire Helicopter Rappel website:**  
<http://www.fs.fed.us/t-d/programs/fire/rappel/index.htm>

### II. Rappel Platform Training Simulator

A rappel platform simulating the cabin area, seating positions, and skid heights of the helicopter will be utilized to train rappellers and maintain proficiency in exit and emergency procedures.

#### A. Tower and Simulator Requirements

1. A minimum height of 20 feet above ground level. Rappeller experience will be greatly enhanced from a higher platform.
2. The tower, stairs, platform, handrails, rappel anchor, and spotter tether attachment point shall meet agency and OSHA requirements for construction (Walking-working surfaces/1910).
3. The rappel anchor and spotter tether anchor must meet OSHA standards for fall-arrest (fall protection systems criteria and practices/1926.502; Safety belts, lifelines, and lanyards/1926.104).

4. Rappel tower should be inspected annually and daily before any use. Program manager may delegate inspections. Example inspection forms can be found in Appendix C.

**NOTE: See MTDC Tech Tip 0857–2354–MTDC for more information on tower design and construction.**

### III. Individual Rappeller/Spotter Equipment

#### A. Nomex® Clothing and Boots

Spotter and Rappeller shall wear Nomex® shirt and pants or Nomex® flightsuit for rappelling operations. If wearing Nomex® flightsuit while rappelling, clothing under flightsuit shall be dictated by mission requirements (e.g., fireline PPE). Boots shall meet NFPA standards for fireline operations (see FSH 6709.11, Chapter 20 for boot standards)

#### B. Helmets

Spotter and Rappeller Helmets must meet minimum standards for Interagency approved flight helmets as defined in the IHOG.

#### C. Eye Protection

For any rappel operation, rappellers must wear eye protection that meets ANSI Z87. The visor down on flight helmets meets this requirement.

#### D. Gloves

1. Spotters shall, at a minimum wear, approved flight gloves. For additional heat protection, spotters may wear a rappel type glove for cargo letdown. The Sullivan PV or PVG glove models; the PMI GL2200x rappel glove; and the Metolius climbing  $\frac{3}{4}$  finger glove are approved for cargo letdown operations. The Metolius glove shall only be used in conjunction with a flight glove.
2. Rappeller's gloves shall be all leather with double-leather palm and fingers and provide sufficient heat protection during a rappel descent. For wildland fire rappel operations, the Sullivan PV (short) or PVG (gauntlet) Rappel Gloves are the approved gloves.
3. Inspection:
  - a. Inspect stitching for abrasion and wear
  - b. Leather should be free from cuts or holes. Pay special attention to the area between thumb and forefinger
  - c. Leather should also be inspected for oils, pitch, or other contaminants
  - d. Hook and pile Velcro should adhere well when pressed together
  - e. Gloves must be inspected by user prior to each use

### **E. Belly Deployment (BD) Bag**

1. BD bag must be designed in accordance with drawing # MTDC-1038. The maximum weight of the BD bag shall not exceed 30 pounds. The female end of the click lock buckle must be attached to the harness by a webbing loop manufactured in accordance with drawing #MTDC 1023. The webbing loops/buckles must be attached to the rappel harness below the rappel hook according to the directions in Appendix F, Specified Equipment Attachment Standards. Loose straps must be secured to prevent entanglement during the rappel process.
2. Inspection:
  - a. BD Bags must be inspected by user prior to operation
  - b. Inspect stitching for abrasion and wear
  - c. Zipper should function properly and store completely in pocket
  - d. Check to ensure all buckles function properly

### **F. Required Minimum Personal Rappeller Equipment**

1. The following items are essential and must be carried on each rappeller during any rappel operation. These items are to provide essential safety and survival equipment in the event cargo equipment delivery is delayed
  - a. Fire Shelter
  - b. Hard Hat
  - c. Leather gloves
  - d. Headlamp
  - e. 2 quarts of water
  - f. First Aid Kit
  - g. 10 AA Batteries
  - h. Space blanket/Sleeping Bag
  - i. Food (1 meal)
  - j. 1 Fusee
  - k. Line Gear
  - l. BD Bag
2. The remaining items must be carried with each stick (2) of rappellers.
  - a. Radio
  - b. A map of the area
  - c. Compass and GPS

### **G. Required Minimum Rappeller Initial Attack Cargo Equipment List**

1. In addition to the items carried by each rappeller, the following items shall be packed into a single approved container (box) and delivered to each stick of rappellers:
  - a. Food for 36 hours
  - b. 3 gallons of water
  - c. 2 Hand Tools
  - d. 1 Tent fly (9x10)
  - e. 1 Roll of toilet paper
  - f. 6 Trash Bags
  - g. 1 First Aid Kit
  - h. 2 Pack-out bags
  - i. 1 water treatment
  - j. 1 box(24) AA batteries
  - k. 2 Rolls of flagging
  - l. 100 ft. of Parachute cord
  - m. 1 Roll of fiber tape
  - n. 1 Weather kit
  - o. 6 Fusees
  - p. 1 Bastard file
  - q. IC Kit / Paperwork
  - r. 1 Pen (Sharpie)
2. A power chainsaw, fuel, oil, necessary accoutrements, and additional water shall be packaged in a single approved cargo container (box) and delivered to rappellers depending upon need and discretion of firefighters and spotter.
3. Potable water may also be packaged in an approved 5-gallon cubitainer and harness and delivered in addition to the cargo and chainsaw equipment containers (see section VII, D, 1, of this chapter) for the purpose of augmenting the 3-gallons of water or to re-supply firefighters as necessary.

#### **H. Spotter Harness**

Rappel and Cargo Letdown Spotters shall wear the Miller Revolution Harness during all helicopter rappel/cargo letdown and tower operations. The harness shall be issued and tagged with a unique identifier that corresponds to an in-service date. Harness tags from the manufacturer may be used.

1. Two (2) harness sizes are available:
  - a. The small/medium size model RDT-QC/S/MBKU (will fit most spotters)
  - b. A larger size harness model RDT-QC/UBKU is also available
2. Inspection:
  - a. The spotter harness must be inspected by the user prior to operation.
  - b. Inspect stitching and webbing for abrasion, wear or other damage.

- c. Check leg strap buckles, chest strap buckles, dorsal D-ring and Cam Buckle adjusters for correct adjustment and function.
- d. Check Pivot Link connectors for correct function.
- e. Service life is based upon inspection

**NOTE: The following equipment must have a date stamp and will have a life cycle of 10 years after the manufactured date: Extendable Spotter Harness Tether (MTDC-1039), Spotter Tether Attachment (MTDC-946), Rappel Gunner Strap (MTDC-984), and Safety Snub Strap (MTDC-958).**

#### **I. Extendable Spotter Harness Tether**

The extendable harness tether is the interface between the spotter harness' dorsal attach point and approved hard-point. The extendable spotter tether for the Miller Revolution Harness RDT-QC/S/MBKU will be manufactured in accordance to drawing # MTDC-1039 Extendable Spotter Tether.

1. The harness tether must adjust to prevent the dorsal attachment point from extending past the door sill of the helicopter in the non-extended configuration.
2. The SMC Lite Stainless Steel Locking (bright) carabiner is attached to the free end of the spotter tether connecting to an STC or manufacturer approved helicopter hard-point, tower hard-point, or other approved tether attachment point.
3. The Large Extendable Tether will be used with each type 2 model of rappel helicopter (Bell 205, Bell 210, Bell 212, or Bell 214).

The tether is designed to extend an additional 18 inches of length, as necessary to assist a rappeller in distress or to clear a letdown operation. To deploy, the spotter will free the red pull snap and lift the ejector snap releasing the v-ring. The additional tether webbing will deploy as tension is added to the tether. There is no need to manually deploy or unfasten the Pull-the-Dot snap straps when deploying the tether extension.

When the extended length is no longer required, the spotter will reconnect the v-ring to the ejector snap as soon as practical. The extendable section of webbing will be re-secured by re-fastening the Pull-the-Dot snap straps when the mission has ended.

If a spotter has to release the extendable section of their tether to assist a rappeller or deal with a cargo letdown problem during tower training, a proficiency rappel, or an operational rappel, it is considered a reportable

event. The SAFECOM system will be used to report such deployments whenever they occur.

4. Each spotter harness tether shall have a date stamp and will have a life cycle of 10 years after the manufacture date.
5. Inspection:
  - a. Tether is inspected with spotter harness prior to operation
  - b. Stitching and webbing for abrasion, wear or other damage
  - c. Metal hardware should be free from cracks, dings, or other damage
  - d. Extendable tether material must be stowed and captured by Pull-the-Dot snap straps
  - e. The tag end of webbing that locks the adjuster shall be tacked onto the webbing loop that passes through the dorsal D-ring using nylon 5-cord as shown in Appendix F
  - f. Meets lifetime criteria for use (10 years)

#### **J. Rappel Spotter Tether Attachment**

1. Rappel Spotter Tether Attachment will be manufactured in accordance with drawing # MTDC-946. The Spotter Tether Attachment will secure the spotter harness tether to the aircraft. The ring on the Spotter Tether Attachment will be positioned at the centerline of the aircraft.
2. The Spotter Tether Attachment will be installed in the aircraft as outlined in Chapter 5, IV, C, of this Guide in accordance with the ELAM STC Installation Instructions.
3. Each Spotter Tether Attachment shall have a date stamp and will have a life cycle of 10 years after the manufacture date.
4. Inspection:
  - a. Inspected by a spotter prior to each use
  - b. Inspect stitching and webbing for abrasion, wear or other damage
  - c. Metal adjusters and attachment ring should be free from cracks, dings, or other damage
  - d. Meets lifetime criteria for use (10 years)

#### **K. Rappel Harness System**

The Rock N Rescue HR-2 Wildland Fire Rappel Harness System is comprised of several components each requiring special consideration. This harness is the only harness approved for wildland fire rappel missions.



1. Harness: This harness shall be issued and tagged with a unique identifier that corresponds to an in-service date. Harness tags from the manufacturer may be used. The harness will be donned over the user's head without disconnecting any hardware equipment.
  - a. Harness Inspection:
    - i. The harness and connecting hardware must be inspected by the rappeller prior to operation
    - ii. Inspect stitching and webbing for abrasion, wear or other damage
    - iii. Check snaps, v-rings, and adjuster hardware for damage and correct function
    - iv. Service life is based upon inspection
2. Tri-Link: A 10mm Maillon Rapide Delta tri-link is the connection hardware used to attach the locking snaphook to the HR-2 harness soft loops. The tri-link is oriented with the barrel gate on the rappellers left side.
  - a. Tri-Link Inspection:
    - i. Tri-link assembly will be inspected by the user prior to operation
    - ii. Check for damage to tri link hardware
    - iii. Ensure gate is closed with barrel locked
    - iv. Check that both harness soft loops are captured inside of the tri link's hardware
3. Snaphook: A Bourdon 1210 is a captive eye locking snaphook and the final piece of connecting hardware to the rappel harness. Both the BE and BH models of the Bourdon 1210 snaphook are approved for use. The tri link is trapped within the captive eye of the hook connecting it to the harness (see FIGURE 4-1 on the next page). It is the snaphook that attaches the rappel harness to the descent device. The Bourdon hook is stamped 1210 BE or 1210 BH. These hooks have inspection criteria that will be conducted prior to any harness use.
  - a. Snaphook Inspection:
    - i. Snaphooks will be inspected by the user prior to operation
    - ii. Check the hook and hook gate for cracks and wear
    - iii. Check the function of the spring-loaded gate and detent pin
    - iv. Ensure the end of the detent pin is peened and functions correctly
    - v. Attempt to unscrew (turn left to loosen) the two halves of the detent pin. If the pin has any free play, the two halves of the detent pin move independently, or the gate opens without depressing the detent pin, it is defective and **SHALL BE REMOVED FROM SERVICE.**



**FIGURE 4-1**

4. **Replacement of Connecting Hardware:** The tri-link and locking snaphook may only be replaced by a qualified rappel spotter. After replacing any component of the HR-2 connecting hardware, the spotter shall tighten the locking nut on the tri-link with a wrench until it is not possible to unscrew the locking nut by hand (using fingers only). The spotter and rappeller will each independently verify the work performed and document their inspections by signing off in the harness log.

**L. Rappeller Gunner Strap**

The Rappeller Gunner Strap shall be used as a secondary restraint during the rappel sequence until the spotter gives the rappeller the signal to move to the skid. The Rappeller Gunner Strap shall be manufactured in accordance with drawing #MTDC-984.

1. Each rappeller gunner strap shall have a date stamp and will have a life cycle of 10 years after the manufacture date.
2. Inspection:
  - a. Inspect stitching and webbing on belt and tether for abrasion, wear or other damage.
  - b. Ejector snap, v-ring, and adjuster must be free from cracks, dings, or other damage.
  - c. Ejector snap must release and reset to closed/ready position with minimal force.
  - d. Spring loaded gate on ejector snap must open when pushed and return to closed position when released.
  - e. The gunner strap and connecting hardware must be inspected by a spotter prior to each use.
  - f. Meets lifetime criteria for use (10 years)

**NOTE: Any equipment item with time life criteria of 10 years shall be retired once it meets that time limitation. If manufacture date stamps for equipment become illegible, damaged, or lost, they shall be replaced and then documented in the applicable equipment log. Replacement tags must correspond with the original manufacture date in the equipment log. Any equipment with a time life limitation that cannot be age verified shall be retired.**

## **IV. Rappel Rope**

### **A. Rope Standards**

All helicopter rappel operations will use Descent Control's L4 Nylon Type 4 Rope. This is one-half inch diameter braided nylon rope is manufactured in 250 foot lengths. Three metal swages, one inch apart, attach a 3/8 inch metal eye (thimble) to each end of the rope.

The type rope and length is stamped on the first (closest to the thimble) swage. The date of manufacture is stamped on the second (middle) swage and a manufacturer's unique serial number is stamped on the third swage. This unique serial number will meet the intent of the identification for documentation purposes. A different "unit" number can also be engraved locally or stamped by the manufacturer.

### **B. Procedures for Conditioning New rappel Ropes**

New ropes must be conditioned prior to use. The following steps describe the conditioning process:

1. Remove new rope from plastic shipping bag and randomly flake into a pile on a clean, dry surface (not concrete or asphalt)
2. Carefully inspect entire rope, including swages and thimbles, for visible defects. If no significant defects are discovered and rope appears serviceable, enter initial rope data into rappel equipment log and record pre-use inspection
3. Randomly flake rope into rappel rope bag
4. Select an open, flat area with a clean dry surface to lay out rope - secure swivel to a fixed hard-point 2 to 3 feet above ground level
5. Use carabiner to attach eye of free rope end to swivel
6. Walk with rope bag away from attach point to lay out rope in a straight line – do not drag rope over the ground

7. Stretch full length of rope by pulling on opposite end from swivel; apply tension by having one or two personnel pull on the rope end (do not use mechanical means to accomplish this task, such as pulling on the rope with an ATV, winch, or block-and-tackle). If tension on rope causes the swivel to spin, hold tension until spinning ceases. The amount of tension applied should be sufficient to briefly lift most or all of the rope off the ground.
8. Attach the descent device to the rope in the same way it would be rigged for rappel, with the upper (thumbscrew) end toward the swivel
9. Starting at the end to which the swivel is attached, walk the full length of the rope while sliding the descent device along the rope. When the end is reached, remove the descent device, walk back to the starting point, and re-attach the descent device to the rope. Walk the rope 9 more times in this direction.
10. Disconnect rope from swivel and re-bag rope. Attach opposite end of rope to swivel. Repeat steps 6 through 9. This process must be documented in the rope log. However it does not count toward the use life of the rope.
11. If at any time during this process the rope begins coiling below the descent device to the extent that it interferes with the rappeller's ability to slide the descent device to the end of the rope, the rope should be logged as a "twisty rope" and removed from service. No more conditioning or rappelling with this rope should be permitted. In addition, a SAFECOM should be filed for any rope that is removed from service because of excessive twisting.
12. If the rope does not show signs of twistiness during the break-in process, completion of the conditioning process should be recorded in the rope log.

### C. Rope Care

1. Rope Protection: Ropes that are redirected at an angle, such as over a doorsill or through a carabiner, shall have a reinforced vinyl hose jacket to give protection. It must give sufficient protection to minimize direct right angles to rope and eliminate rope damage on edges. All ropes shall be ordered and have in-place a reinforced vinyl jacket, 18" in length.
2. Drying Wet Ropes: If ropes accidentally become wet, the ropes should be air dried, away from direct sunlight. Do not dry ropes on concrete or asphalt surfaces chemicals in concrete and asphalt can contaminate and damage ropes. Never dry a rope in clothes dryer.

3. Extending Service Life:

- a. Avoid stepping on ropes
- b. Avoid prolonged exposure to sunlight - dry ropes in the shade
- c. Never expose ropes to rough surfaces
- d. Avoid dragging ropes on the ground
- e. Descent devices will be removed whenever ropes will be stored more than one operational period
- f. After ropes have been released from helicopter, avoid dragging ropes across limbs and brush whenever possible - the fine nylon fibers that make up the Descent Control rope are very susceptible to snagging
- g. Avoid contact with all chemicals that may contaminate rope
- h. Keep ropes away from heat sources
- i. Avoid laying ropes on concrete or asphalt
- j. Avoid contact of the rope with Velcro

4. Storage: All ropes shall be stored under clean, dry, cool conditions. Any rope stored in its original packaging in a cache or warehouse shall not be stored directly in contact with the floor. The ambient temperature shall be maintained between 0° F and 100° F. After placed in service, ropes may be stored in rope bags, provided that clean, dry storage conditions prevail.

**D. Rope Use**

Rope use and inspection standards were developed and codified in a San Dimas TDC Memo issued May 1990, "Time in Service and On Condition Guidelines" and approved in the same month. These standards were again issued in an Aviation Tech Tip, June 1992, 5700-9257, 1306-SDTDC section on recommendations regarding rappel rope care. The standards are included in the following:

- 1. No rope shall be used more than five years after its manufacturing date.
- 2. All ropes shall be stored under clean, dry, cool conditions. Any rope stored in its original packaging in a cache or warehouse shall not be stored directly in contact with the floor. The ambient temperature shall be maintained between 0 F. and 100 F. After placed in service, ropes may be stored in rope bags, provided that clean, cool, and dry storage conditions prevail.
- 3. A log book shall be kept for each rope once placed in service. Information in the log shall include at least the following:
  - a. The date, length, and type of each rappel.
  - b. The name of the rappeller.
  - c. The end of the rope which was attached to the helicopter or tower.
  - d. Any other information the rappeller or spotter feels is important to the safety or serviceability of the rope.

4. No rope shall be used for more than 100 rappels per end.
5. No rope shall be used if it shows evidence of any overheating or burning, visible damage which would compromise its strength or safety, contamination with foam concentrate, retardant, or any petroleum product, or any damage which affects more than 25% of any woven strand of the rope.
6. For rope documentation guidelines refer to chapter 7 of this Guide.

#### E. Rope Inspection

1. When a rope is in service, it shall be thoroughly inspected after every use. First, untangle the rope into a loose, knot-free or "flaked" pile on a clean surface. Next, inspect a short section at a time. Feel the rope, without gloves, for deformities, burrs, or anything out of the ordinary. Look for visual indications of abuse: puffs; boogers; heat glazing or anything that may indicate rope damage. If damage is apparent, remove from service and document on the rope log sheet.
2. Swages and thimbles shall be inspected for deformities, cracks, and sharp edges (see Safety Alert IA 08-08). Sharp edges on swages or thimbles may be smoothed using emery cloth or a fine file. Make sure metal filings do not drop into rope weave. Thimbles and swages should be snug. If not, return to manufacturer or retire it.
3. After the rope has been inspected and Ok'd for service, a tag will be placed through the thimble to signify the rope is ready for use (see FIGURE 4-2).
4. To maintain even wear and to maximize each ropes useful life, rope ends will be rotated after each rappel sequence. To track this, each end shall be marked A and B respectively.
5. Inspection/Retirement Criteria:
  - a. Ensure rope is not used more than five years after its manufacture date
  - b. Ensure rope is not used more than 100 rappels per end
  - c. Any portion of the rope has been cut or severed in any way
  - d. There are burns or significant wear marks over 50% of the rope length
  - e. There is visible damage which would compromise its strength or safety
  - f. When more than 25% of surface strands have been pulled out in a loop, and cannot be worked back into rope
  - g. There is evidence of several bundles bonded together by heat



**FIGURE 4-2**

- h. The rope is contaminated with foam concentrate, retardant, or any petroleum product
  - i. There is any damage which affects more than 25% of any woven strand of the rope, such as a cut
  - j. Cracks or gross deformities appear on metal components
  - k. Retire if there is any evidence of incorrect rope splicing (see MTDC website for rope anomalies document which describes rope splicing anomalies)
  - l. Retire any rope found to meet the definition of a “twisty rope” (see MTDC website rope anomalies document for description and treatment of twisty ropes)
6. Nothing limits the discretion of either the spotter or the rappeller to retire a rope. Final retirement determination will be made by a qualified spotter. Inspection of any rappel rope must be done carefully and methodically.

#### **F. Rope Service Life Factors**

1. Heat: It is imperative to document any type of heat damage to rappel ropes. Although some ropes may be more tolerant to heat damage than others, it can be assumed that if a rappeller can smell a pungent odor of burning nylon, sufficient damage has been caused to create concern and necessitate close inspection and documentation in the rope log. As the rappel device heats up during the descent, it may become hot enough to glaze or melt the rope, especially when coming to an abrupt stop after a long descent.

For nylon rope, a critical temperature of 350° F will cause breakdown in fibers. At 480° F, melting will begin. A rapid rappel to minimize exposure under a hovering helicopter will inevitably cause heat damage, reduce rope life, and may require immediate rope retirement, even with a new rope. After each rappel, visually check the rope for glazed areas or feel for hard, stiff areas that may indicate heat damage. If any damage is found document it on the rope log sheet. If there is any doubt concerning extent of rope damage, retire the rope.

2. Dirt: Any contaminant which works into the fibers and construction of the rope will cause deterioration. Mud, dirt, and sand can cause abrasion damage to rope fibers and descent device. Because of the potential for fiber abrasion, ropes should not be stepped on. Look for excessive mud and dirt. Feel the rope for grit, cheat grass, or other particles that could possibly work into the rope. Avoid dragging the rope over the ground.
3. Chemicals: Contact with acids or bleach must be avoided. Chemical damage to ropes can occur and may not be visually detected. Because of this

potential hazard, ropes should always be stored in a rope bag away from batteries and chemicals. Alkalis, oxidizing, and reducing agents (e.g., bleach, fire retardant, or foam) are all known to be damaging to nylon. Nylon is unaffected by hydrocarbons; however, additives in these agents may adversely affect the rope.

4. **Cross-Contamination:** Any surface that ropes or other rappel gear may potentially contact should be inspected for the presence of contaminants that can damage ropes, gloves, harnesses, and other gear. Textiles and leather can absorb and transfer contaminants to other gear. Petroleum products can reduce the friction between rope and descent device, making a rappeller's descent harder to control. Pitch from coniferous trees can increase the friction between rope and descent device, making it more difficult to descend. Fire retardant contains powerful corrosive agents that can damage metal hardware. Any source of contamination, including dirty fire shirts with chainsaw bar oil stains on the shoulder, dirty Nomex® pants, and dirty/retardant covered line gear, must not be allowed to come into contact with ropes, gloves, harnesses, descent devices, carabiners, and other rappel gear. Ropes and rappel gear should always be stored in a clean, dry, chemical-free, rodent-proof locker or vehicle compartment when not in use. The interior seats and cabin of helicopters used for rappelling must be kept exceptionally clean.

## **V. Descent Device**

### **A. Descent Device**

For helicopter rappelling, the one-half inch Sky Genie descent device (Model no. # 14GO), manufactured by Descent Control, Inc., shall be used by all fire rappel operations. This is a two-piece descent device composing a shaft and cover. (Cover will have the Interagency Wildland Fire Helicopter Rappel Genie Decal on it). Users shall engrave identical identification numbers on both the descent device shaft section and cover to ensure that these components remain together for the life of the descent device. Engrave the unique identifying number on the shaft section across the top of the lock-off horns. A matching number will be engraved on the lower left corner of the descent device cover with a small decal area removed for easy engraving.

### **B. Configuration**

A standard of 2½ wraps of the rope around the shaft shall be used. The rope shall enter the front and exit the back of the cover and show two wraps in the cover window. Follow the arrow on the shaft for direction of wraps. It must be used only with the Descent Control, Inc., one-half inch diameter rappel rope (Type 4). The retirement life for the Sky Genie descent device is based on the wear grooves on the



shaft. The descent device shall be retired after a 1/16-inch deep wear groove is observed.

### C. Care and Inspection

1. To extend service life of equipment be sure to:
  - a. Avoid rough handling
  - b. Do not drop or drag on the ground
  - c. Store descent device with covers installed when not in use
  - d. Keep Clean
2. Post rappel inspection – check for:
  - a. Dents in cover
  - b. Rough or sharp surfaces on cover and shaft
  - c. Scratches or excessive wear on shaft
  - d. Faulty detent pin or locking screw
  - e. Cracks or breaks
  - f. Cover fitting on shaft
  - g. Dirt, tree sap, etc.
  - h. Wear on cover, inside or out, at thumb screw slot or detent pin hole
  - i. Reference IA 09-03

## VI. Ancillary Equipment

### A. Carabiners

The only carabiner approved for Forest Service Rappel and cargo letdown operations is the SMC Lite Stainless Steel Locking (bright) carabiner. Carabiners will come from the manufacturer stamped:

- *MEETS NFPA 1983 and either 2001 ED or 2006 ED*

**NOTE: Carabiners are designed to be loaded longitudinally – if loading occurs on the side(s) or gate, gate failure may occur.**

1. For programs wishing to identify their equipment, Seattle Manufacturing Corporation (SMC) has released guidelines for the proper way to permanently mark their mountaineering, rescue, industrial and work-safety products. Additional information can be obtained at:  
<http://www.smcgear.net/news/4-smc-announces-guidelines-for-permanent-marking-of-gear>
  - a. It is only acceptable to use a hand held electric type engraver to place identifying marks on hardware. DO NOT strike with a hammer and stamps or ever use other similar methods. Once the marking process has been completed, ALWAYS inspect the product for proper fit and

function PRIOR to returning it to service. If you ever have concerns or questions you are advised to contact SMC directly at 1-800-426-6251 or info@smcgear.net

- b. For carabiners it is recommended to mark along the spine of the frame. DO NOT mark on or near the lock or pivot tabs of the frame and stay away from rope bearing areas. DO NOT mark on the gate. For steel and stainless products use a medium setting with medium to heavy pressure. For Aluminum products use a low setting with light to medium pressure. Depth of engraving equal to the thickness of a piece of paper should be enough to last the life of the product.

2. Inspection:

- a. Inspect to be sure that gates and locking mechanism function properly. If gate becomes sticky, remove from service
- b. Look for abrasion, burrs, or rough edges – if there is any visual indication that raises question, retire it
- c. When using for rappel or cargo letdown operations carabiners make certain that: Gates are locked when in use; Pull is not on gate; Carabiners are not dropped on ground or hard surface; Rough handling is avoided; Carabiners are kept clean
- d. Carabiners shall be inspected by a spotter prior to each use

**B. Knife/Knife Sheaths**

All rappellers and spotters are required to have a Raptor knife, a hook-shaped knife, with lanyard, readily accessible for emergency use. The Raptor knife is required for use by rappellers and spotters. Spotter may elect to remove lanyards from their knives to allow greater range of movement.

- 1. The rappeller Raptor knife shall be enclosed within the MTDC rappeller Raptor sheath (MTDC drawing 1041) and attached to the rappel harness in the manner shown in rappel bulletin 021103.
- 2. The spotter Raptor knife shall be enclosed within the MTDC rappel spotter Raptor sheath (MTDC drawing # 1042) and attached to the spotter harness in the manner shown in rappel bulletin 051005.
- 3. Inspection:
  - a. Knife sheaths are to be inspected with any harness inspection
  - b. Knives shall be inspected annually or prior to being installed on a harness
  - c. Ensure knives used for rappel have properly installed blades.
  - d. Knife blades must be changed after any use and will be closely supervised by a rappel spotter

- e. Handle/body of knife should be free from damage, screws should be tight
- f. The sheath should be in good condition
- g. Ensure the lanyard is stowed and attached correctly
- h. Pull snap(s) should close/open with enough resistance to prevent inadvertent opening

### **C. Safety Snub Strap**

An approved safety snub strap will be utilized as a backup device to securely connect rope(s) to the rappel anchor(s) or to one another. The snub straps shall be manufactured in accordance with MTDC drawing #958 for double rope capable anchors.

1. Each Safety Snub Strap shall have a date stamp and will have a life cycle of 10 years after the manufacture date.
2. Inspection:
  - a. Inspect stitching and webbing for abrasion, wear, or other damage
  - b. Body of static line snaps must be free from cracks, dings, or other damage
  - c. Detent buttons must depress and reset to closed/ready position with minimal force
  - d. Sliding covers must open and return to the closed position easily
  - e. Inspect body and cover for burrs or sharp edges that could damage ropes
  - f. Snub Straps shall be inspected by a spotter prior to each use
  - g. Meets lifetime criteria for use (10 years)

### **D. Cargo Restraints**

Rappel IA cargo, collapsible water bucket, and any other cargo stored internally within the aircraft cargo area (transmission well positions) shall be secured by restraints conforming to FAA TSO-C22F standards and have a 3,000 lb. load rating. Davis Aircraft Products offer an item that meets these standards: Part No.: FDC6400-569-1-080-80-10.

### **E. Cargo Area Barriers**

Cargo area barriers shall isolate the passengers from the cargo area (transmission wells). The contracting document provides specifications for approved cargo area barriers. Barriers shall be provided by the helicopter vendor.

### **F. Rappel Anchors**

The approved anchor for USFS Bell medium helicopters is the USDA Forest Service External Load Attach Mechanism (ELAM) Rappel Anchor: STC SH261WE. Anchor

should be inspected in accordance with the ELAM Rotorcraft Maintenance Manual Supplement (RMMS).

The anchor should be visually inspected daily for loose hardware, unusual wear patterns, corrosion, and damage. The helicopter mechanic shall be notified if any of these conditions are discovered.

**NOTE: The maximum equipped weight of a rappeller, including full protective clothing, boots, 30 lb. BD bag, rappel harness, rope, and flight helmet may not exceed 300 pounds (this is an equipment limitation – rappel anchors and other equipment such as rappel harnesses are not certified for use with static loads exceeding 300 pounds).**

## VII. Cargo Deployment Equipment

### A. Figure-8 With Ears

For wildland fire rappel and cargo letdown operations, the steel or aluminum CMC Rescue 8 with ears are the only approved letdown device. To rig figure-8, a loop of the line is passed through the center opening of the figure-8 and over the top. A technique referred to as a double wrap can be used for heavier loads. To perform a double wrap merely repeat original process.

1. Take care to:
  - a. Avoid rough handling
  - b. Not drop or drag on ground
  - c. Keep clean
2. Inspection:
  - a. Inspect for grooves developing or flaking occurring in aluminum figure-8. When a groove develops beyond the anodized surface of the aluminum figure-8, wear will rapidly occur. If the groove is beyond 1/16-inch deep, retire the figure-8.
  - b. Inspect the figure-8 for aluminum flaking. This develops rough edges that could cause excessive wear on the line. If flaking is evident, remove the figure-8 from service. Although the acquisition cost is double, steel figure-8's have proven more durable and service life is considerably longer than aluminum, however, steel may cause heat damage more easily because it does not dissipate heat as readily as aluminum.
  - c. Inspect for cracks or breaks. If cracks are evident, retire figure-8.
  - d. Figure-8 must be inspected by a spotter prior to each use.

**B. Carabiners**

Only the SMC Lite Stainless Steel Locking (bright) carabiner is authorized for cargo letdown use. See Chap. 4, VI, A, above for additional carabiner standards.

**C. Cargo Letdown Lines**

1. Letdown Lines: Letdown lines are available in lengths of 250 ft. or 300 ft. Both letdown lines shall conform to military specification, Mil-W-5625K, for woven nylon tubular webbing. Webbing conforming to this standard has a minimum breaking strength of 2,300 lbs.

Letdown lines 250 ft. in length will be of white tubular nylon webbing and conform to drawing #MTDC-983. Letdown lines of 300 ft. in length will be of yellow tubular nylon webbing and conform to drawing #MTDC-983.

To maintain even wear and maximize each lines useful life, line ends will be rotated after each use. To track equipment use, each end shall be marked A or B.

A twenty five foot section from each end of the letdown lines shall be clearly marked in red and a ten foot section in the center of the line should be marked with a contrasting color. Use only Rit dye to mark lines.

2. Accordion Packs: Accordion packs will be constructed as to easily identify a 250 ft. letdown line from a 300ft letdown line.

Accordion packs for 250 ft. letdown lines will be constructed of white cotton duck cloth.

Accordion packs for 300 ft. letdown lines will be made from white cotton duck cloth with yellow seam tape.

To further identify accordion packs, 1 inch stencils will be used to mark the outside surface of accordion packs with the length of letdown line to be used with each size accordion pack.

250 ft. accordion packs will conform to drawing #MTDC-974 and 300 ft. accordion packs will conform to drawing number #MTDC-1037.

3. Packing of Letdown Lines: Letdown lines will be packed in accordance with the Wildland Fire Helicopter Rappel Cargo Letdown Accordion Pack video produced by MTDC. Edge Protection may be necessary along helicopter door edge or helicopter skids to reduce abrasion of the line.

4. Inspection:

- a. Letdown lines will be inspected for wear and burns after cargo deployment and ends reversed for the next letdown sequence.
- b. Inspect stitching and webbing for abrasion, wear, cuts, chemical contamination or other damage.

**D. Cargo Containers and Box Harnesses**

Bags used for cargo deployment are to be manufactured with high strength abrasion resistant materials. The attachment points on the bag must be reinforced to ensure there is not a failure during deployment.

Cargo box shall be constructed from double wall .25" thick cardboard with minimum burst strength of 275 lbs. and shall be certified by manufacturer as having passed Edge Crush Test of 71 pounds (71-ECT). Cargo boxes must be girded with an approved box harness for deployment.

Maximum allowable weight per IA cargo letdown container should not exceed 100 lbs. Maximum allowable weight for non-IA letdown containers (i.e., bags) shall not exceed 125 lbs. Weight limits are to assure that container rated load limits are not exceeded and to facilitate deployment from the helicopter.

Approved cargo letdown containers shall pass a static strength test with no failure or ruptured stitches when loaded to a minimum weight of 468.75 lbs. (safety factor of 3.75 to 1).

Sources for approved cargo letdown containers, harnesses, and cargo loop are listed on the rappel website.

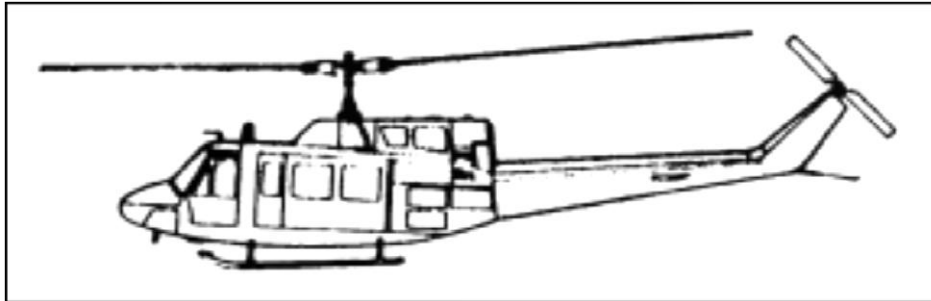
1. The following cargo letdown containers are approved for IA and non-IA rappel operations:
  - a. IA Cargo Box – side-opening, non-tabbed, box with exterior dimensions of 12.5" x 16.25" x 36" (manufactured by Boise Cascade Corp.)
  - b. Standard 5-gallon cubitainer (NFES 0048) and box for delivery of potable water
2. In addition to the above cargo containers, the following containers may be used for deployment of equipment and supplies during non-IA, support, or resupply missions:
  - a. Metolius El Cap Haul Bag
  - b. Large Klamath Bag

3. Approved cargo box and cubitainer box shall each require an approved harness and cargo loop for cargo letdown.
  - a. Box harness webbing, cargo loop, and attachment hardware shall meet minimum tensile strength rating of 1,125 lbs.
4. Inspection criteria for cargo boxes:
  - a. Inspect interior and exterior of the empty box for punctures, rips, cuts, severe abrasion, or failure of glued overlap sections
  - b. Inspect for water damage which may weaken the integrity of the cardboard or weaken the internal glue that attaches the corrugation to the exterior panels
  - c. Inspect for chemical contamination
  - d. Refer to the MTDC website for in-depth inspection standards specific to the cargo box
5. Inspection criteria for box harnesses:
  - a. Prior to installing harness on box, inspect bar tacks and stitching for worn, cut, or broken threads
  - b. Prior to installing harness on box, inspect inner and outer sides of webbing for extensive wear, cuts, severe abrasion, burns, chemical contamination, and mold
  - c. Inspect metal closure buckle for proper function and for cracks, bends, and sharp dings or rough spots that may snag webbing
  - d. Refer to the MTDC website for in-depth inspection standards specific to the box harnesses
6. Inspection criteria for Metolius El Cap Haul and Large Klamath bags:
  - a. Inspect stitching for worn, cut, or broken threads that compromises bag integrity
  - b. Inspect container material for extensive wear, punctures, rips, cuts, severe abrasion, burns, mold, or chemical contamination
  - c. Inspect sling webbing for extensive wear, cuts, severe abrasion, burns, mold, and chemical contamination
  - d. Refer to the MTDC website for in-depth inspection standards specific to the approved cargo bags
7. Cargo boxes, box harnesses, and cargo bags shall be retired if inspection reveals damage or anomalies in accordance with the inspection criteria noted above.





## Chapter 5 – Rappel and Cargo Letdown Operations



### I. Aircraft Model

The Bell Helicopter 205, 210, 212, and 214, are the only models currently approved for US Forest Service rappel operations.

### II. Operational Responsibilities

The spotter shall be responsible for coordinating all rappel activities (pre and post rappel). Before departure the spotter must consider the operational factors that may influence whether the aircraft should depart the base of operations rappel configured or rappel equipped.

On large incidents the spotter shall notify the helibase manager of the need for proficiency rappels in a timely manner as to allow for inclusion in the appropriate Air Operations Summary (ICS-220). The helibase manager shall ensure the appropriate approval is received.

The Spotter will provide subject matter expert (SME) coordination with Incident Management Teams to ensure rappel operations are included in the Incident Action Plan Safety Analysis (ICS-215a) for larger incidents, and SME coordination with local units for smaller incidents and IA staging. The rappel module will complete a GAR Risk Assessment for all rappel operations.

Incident Management Teams shall allow for rappel proficiencies while rappel helicopters are assigned to their incident. The rappel spotter should work with the helibase manager to find a time and location for proficiency rappels that will have the most efficient means and have the least impact on helibase operations. Flight time for proficiency rappels will be charged in accordance with the July 30, 2012, NMAC letter (or current revision) that references proficiency rappels. Personnel time during the proficiencies will remain on the incident management code.

### III. Pre-Rappel Briefing

Prior to any rappel mission, the spotter must brief all personnel involved as to the nature of the mission and its objectives. The information should include environmental concerns such as weather and fire behavior if known, individual responsibilities, incident specific information such as location (e.g., division assignment), radio frequencies, name of communication center, and any other incident specific information. Prior to any rappel operations the pilot and spotter will identify the performance limitations for the aircraft. These limitations will ensure the performance is in the maximum continuous range.

**NOTE: Weight & Balance (W&B) calculations will be performed for standard rappel configurations and emergency rappel scenarios prior to the commencement of rappel operations each season. The purpose is to ensure the center of gravity (CG) will remain within limits. Because of the dynamic environment of the rappel operation where rappellers and spotters move inside and out of the aircraft in flight, it may be possible to exceed the aircraft's CG limitations during rappel operations. In cases where it may be possible to exceed a CG limit during normal or emergency situations, W&B calculations will be performed prior to each rappel mission accounting for actual rappeller, spotter, and cargo weights. If a mission specific W&B calculation indicates the CG could be exceeded during any phase of the rappel operation the load configuration must be adjusted or the mission aborted. Calculation documentation must be maintained at base of operations.**

### IV. Pre-Flight Procedures

#### A. Configure Helicopter

1. For rappel operations, aircraft shall be set-up in the following configuration:
  - a. Remove the right side, two-place (2), forward facing, bench seat (right of center spotter seat)
  - b. If not in place, install right side door post
  - c. Install approved cargo restraints in right-side transmission well
  - d. Install cargo area barriers (i.e., netting) around right-side transmission well cargo area
  - e. Install four (4) gunner straps via larks foot knots (see FIGURE 5-1 on the following page) at the seatbelt rings on the aft facing bench seat: one (1) gunner strap on the ring between the first and third rappeller positions, two (2) gunner straps on the ring between the third and fourth positions, and one (1) gunner strap on the ring between the second and fourth positions (see FIGURE 5-2 on the following page). Gunner straps must be adjusted to prevent rappeller from reaching beyond door opening

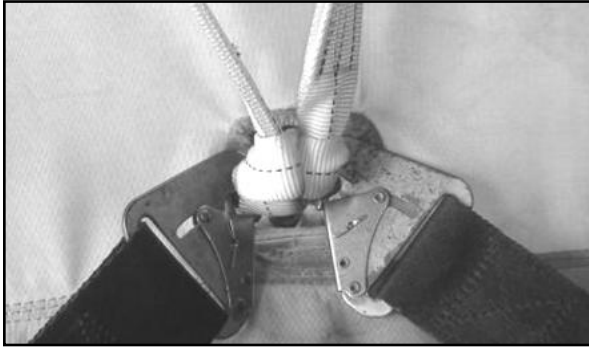


FIGURE 5-1



FIGURE 5-2

**NOTE:** The standard and maximum load of rappellers is four (4), seated in the aft facing bench seat. Loads less than four (4) are acceptable. Normal deployment of rappellers shall occur from both doors, two (2) rappellers, simultaneously. Two-door operations and simultaneous deployment of rappellers reduces overall hover time and unloads weight from the aircraft more quickly. A single rappeller may be deployed as necessary to meet specific mission and personnel needs.

**NOTE:** The aft facing bench seat positions are the only approved seating for rappellers when conducting rappel operations. Specific seating arrangement for each helicopter must be approved in the helicopter flight manual or STC.

## B. Cargo Loading

1. Cargo shall be loaded and secured under the supervision of a qualified spotter
  - a. Load standard rappel cargo (IA fire equipment, chainsaw, etc.) in approved container(s) in right transmission well cargo area
  - b. Restrain IA cargo utilizing approved cargo restraints
  - c. Secure cargo behind approved cargo area barrier (i.e., netting)

**NOTE:** During rappel missions, IA letdown cargo shall be carried in the right transmission well and deployed from the right side of the aircraft. This standard is to accommodate the narrower CG envelope on the left side of the Bell Medium helicopter. Cargo for support missions may be deployed from the either side of the aircraft as long as a Weight & Balance calculation performed by the pilot assures that the CG limits will not be exceeded at any phase during the flight.

### C. Spotter Tether Attachment Point

1. Install the Spotter Tether Attachment above the spotter seat on the upper half of the transmission housing
  - a. Each end of the tether webbing shall be secured through the provided and mounted ring & stud fittings
  - b. The two ring & stud fittings shall be installed by the helicopter operator on the outside edge of the transmission housing, one on each side, at one of two approved installation point waterlines (see FIGURE 5-3 on previous page) in accordance with the USFS ELAM STC Installation Instructions
  - c. Tether, when installed between the two ring & stud fittings, must be no shorter than 36" in length.



**FIGURE 5-3** side, at

**NOTE: Contact Brett Terning, Aerospace Engineer, USFS, at 208-387-5877, for specific installation and inspection standards for the External Load Attach Mechanism (ELAM) (Rappel Anchor) including the ring & stud fittings.**

### D. Rigging Rappel Anchor

1. The rappel anchor (ELAM) shall be rigged in the following manner under the supervision of a qualified spotter:
  - a. Install two SMC Lite Stainless Steel Locking carabiners to overhead anchor hard-points, barrels down, gates facing aft
  - b. Rout safety snub between anchor and ceiling (see FIGURE 5-4)



**FIGURE 5-4**

- c. Install SMC Lite Stainless Steel Locking carabiners at forward slot of each door bracket, barrel down, gate facing inboard
- d. Install a second SMC Lite Stainless Steel Locking carabiner to each upper carabiner, barrel down, gate facing aft

- e. Thread each rope through the lower carabiner at the door bracket
- f. Attach each rope end thimble to the carabiner on the overhead anchor and lock the carabiners
- g. Attach safety snub strap to rope(s) between first and second swage and ensure both detent pins face to the right
- h. Ensure rope protector is in contact with lowest carabiner on door bracket (see FIGURE 5-5)
- i. For single rope operation, free end of snub strap will be secured to the carabiner on the off side of the rappel anchor
- j. Ropes may be pre-rigged with descent devices prior to installation in helicopter
- k. Secure rope bag
- l. Spotter shall then inspect all rappel rigging once installed



FIGURE 5-5

#### E. Pre-flight Briefing and Administration

1. Prior to departure, the pilot and involved personnel shall receive a briefing on mission objectives, communications, known hazards, and any special mission information.
2. Load calculations and manifests complete and posted.

#### F. Buddy Check

**NOTE: A Buddy Check will be completed prior to a rappeller preparing to board the aircraft. All steps of the Buddy Check are to be performed visually or visually and tactilely for thoroughness. Rappeller being checked will be attentive to each step of the Buddy Check process. If a discrepancy is found this check needs to be started over from the beginning.**

**NOTE: Items noted below in bold typeface must be checked both visually and tactilely.**

1. Flight Helmet
  - a. Condition - (no cracks or damage)
  - b. Eye protection
  - c. **Visor down & tight** or approved eye protection on with **visor up & locked**
  - d. **Mic boom up and tight**

- e. Chin strap secured, adjusted for snug fit, with no loose ends
  - f. Avionics cord tucked into Nomex® shirt or flight suit
2. Nomex® Clothing
- a. Shirt tucked in collar up, buttoned to the top, flight suit fully zipped
  - b. Pockets with Velcro or buttons empty, pockets with zippers zipped
  - c. Sleeves rolled down covering arms – no holes, clean & tight at wrist
3. Rappel Gloves
- a. **Gloves in good condition, fastened with no loose ends, and free of pitch or contaminants**
  - a. **Stitching and Padding with no holes (palms, between fingers, flap, thumb/forefinger gusset)**
4. Harness
- a. Risers
    - i. **Snug fit**
    - ii. Webbing and visible stitching in good condition
    - iii. No twists
    - iv. Buckles secured with no visual defects
  - b. Lat Straps
    - i. **Snug fit**
    - ii. Webbing & stitching in good condition
    - iii. No twists
    - iv. Plastic or nylon keepers in place
  - c. Soft loops - webbing & stitching in good condition
  - d. Both soft loops **captured into** tri-link
  - e. **Tri-link is locked, barrel down & tight to rappellers left – physically attempt to loosen.**
  - f. **Snaphook is captured in tri-link**
  - g. **Snaphook locked, Snaphook opens, Snaphook locks again**
  - h. Visually check snaphook detent pin, no obvious gap and the center shaft is peened
  - i. **Pull entire Snaphook/tri-link/soft loop assembly – look, see, & feel metal-into-metal**
5. BD Bag
- a. **Click locks secured, horns out**
  - b. Top straps through handle, buckles secured
  - c. Side straps tight
  - d. Zippers on left side of BD Bag with pull tab stowed under cover
  - e. Double tap on BD Bag to indicate rappeller to lift bag
  - f. Bottom of BD Bag in good condition

6. Leg Straps
  - a. Buckles attached, no fabric caught
  - b. Webbing & stitching in good condition
  - c. No twists, snug fit, loose ends secured
7. Raptor Knife
  - a. **Secured in sheath on Rappelers left, both snaps secured**
  - b. **Lanyard stowed, horn facing aft**
8. Nomex® Pants & Boots
  - a. Nomex® pants/flight suit in good condition
    - i. **Velcro in good condition and no hooks showing**
    - ii. **Velcro or button pockets empty, pockets with zippers zipped**
  - b. Waist belt clear of cases or pouches, etc.
  - c. Pant cuffs over approved boots
9. Single tap on BD bag to indicate rappeller to turn around
10. Rappeller's Back Side
  - a. Helmet in good condition
  - b. Hair tucked into Nomex® shirt, flight suit, or helmet
  - c. Avionics cord tucked in if necessary, collar up & no loose ends
  - d. Harness
    - i. Webbing & visible stitching in good condition
    - ii. No twists
    - iii. Buckles & loose ends secured
  - e. Nomex® shirt & pants
    - i. Velcro in good condition and no hooks showing
    - ii. Waist belt clear of cases or pouches
    - iii. Velcro or button pockets empty
    - iv. Pockets with zippers zipped
    - v. Pant cuffs over approved boots with no accessories attached to boots
11. Indicate rappeller to turn around with a tap on the left shoulder
12. Exchange thumbs-up - "I AGREE, I AM O.K."

## G. Boarding Sequence

1. Once Buddy Check has been completed, rappellers organize into proper rappel order and prepare to board the aircraft. Rappelers load from inboard seats out.

2. Starting with rappellers boarding on right side of aircraft then moving to left side, spotter performs equipment check on each rappeller, replicating the steps for a Buddy Check. If all is correct, a thumbs-up signal is exchanged. If a discrepancy is identified, it will be immediately corrected and the spotter will restart the equipment check from the beginning.
3. Once complete, each Rappeller boards aircraft and takes pre-assigned seat. The first rappeller boarding on each side will perform a full inspection of the rigged descent device(s), rope attachment, and safety snub strap, then attaches their gunner strap.
4. When attached, the gunner belt ejector snap will be on the right, v-ring on the left, the connection will be on right side of rappeller's body. Gunner strap will be worn taut around rappeller's waist. Rappeller then buckles seatbelt and plugs into ICS system if appropriate. Gunner strap and seatbelt must be below the snaphook.
5. Last rappeller to be checked completes equipment check on spotter (see section H below) prior to boarding the aircraft. If all is correct, a thumbs-up signal is exchanged, and then rappeller boards aircraft.
6. Spotter completes preflight walk around.
7. Spotter enters aircraft, checks descent devices, ropes, snub strap, and hard point connections. Spotter taps inboard rappeller's knees and points to rigging. Thumbs-up signal between spotter and inboard rappellers indicating inspections have been performed.
8. Spotter, checks rappeller's seatbelts and gunner straps, and ensures doors are shut and secure.
9. Spotter connects tether, plugs into radio system, takes seat, fastens seatbelt, displays tether showing carabiner attached to hard point, and seatbelt secure. If all is correct, a thumbs-up signal is exchanged with all rappellers on board.

#### H. Equipment Check of Spotter by Rappeller

**NOTE: Spotter being checked will be attentive to each step of the equipment check process. If a discrepancy is found this check needs to be started over from the beginning.**

1. Flight Helmet
  - a. Good Condition - no cracks or damage avionics in place



- b. Eye protection – not required for a spotter
  - c. Chin strap secured, adjusted to fit snugly, with no loose ends
- 2. Nomex® Shirt/Flight Suit
  - a. Good condition, shirt tucked in collar up, buttoned to the top, flight suit fully zipped up
  - b. Sleeves rolled down covering arms (no holes, clean & tight at wrist)
- 3. Gloves
  - a. Gloves in good condition, fastened with no loose ends, and free of pitch or contaminants
- 4. Miller Harness – Front Side
  - a. Risers
    - i. Visible webbing & stitching in good condition
    - ii. No twists, buckles secured with no cracks, keepers in place
  - b. Chest Strap
    - i. Positioned mid-chest
    - ii. Buckled & snugly fit
  - c. Leg Straps
    - i. Buckles attached, no fabric caught
    - ii. Visible webbing & stitching in good condition
    - iii. No twists, snug fit, loose ends secured, keepers in place
  - d. Raptor Knife
    - i. Secured in sheath on left riser
    - ii. Horn facing to left side
    - iii. Lanyard stowed
- 5. Nomex® & Boots
  - a. Nomex® pants/flight suit in good condition, no Velcro showing
  - b. Pant cuffs over approved boots
- 6. Indicate spotter to turn around with a tap on the left shoulder
- 7. Spotter's Back Side
  - a. Helmet in good condition
  - b. Collar up
  - c. Harness - visible webbing & stitching in good condition with no twists
  - d. Spotter tether attached to dorsal O-Ring through double pass adjustor and tacked
  - e. Extendable tether stowed, all snaps in place
  - f. Ensure carabiner in place at end of tether
  - g. Buckles & loose ends secured

- h. Nomex® shirt, pants or flight suit in good condition, no Velcro showing
- i. Pant cuffs over approved boots

8. Tap on left shoulder to indicate spotter to turn around.

9. Exchange thumbs-up - "YOU ARE O.K., I AGREE"

#### **I. Rope Security**

Prior to flight, spotter will ensure rope(s) and rope bag(s) are secured in the aircraft. After rappel configuration is complete spotter ensures positive control of rope bag is maintained by the rappeller closest to the exit door, throughout the duration of the flight or until rope(s) are deployed for rappel.

#### **J. Preparing for Flight**

1. Prior to flight, spotter and pilot establish comms through intercom and ensure the following steps are accomplished:
  - a. Ensure all mission specific items have been addressed
  - b. Set radio frequencies as appropriate
  - c. Confirm action entered into GPS if applicable
  - d. Spotter states to pilot, **"OK to depart"**
2. Once in flight, contact appropriate flight following authority (ATGS, HLCO, dispatch, etc.).

### **V. In-Flight Procedures**

All communications between spotter and pilot related to the deployment of rappellers and cargo will be done in the form of challenge and response. Spotter shall provide constant feedback to the pilot of the position and movement of the aircraft, proximity to hazards, and progress of the rappellers and cargo descent. During deployment of rappellers and cargo, the pilot shall maintain the hover without utilizing vertical reference/longline procedures.

#### **A. Pre-Rappel Sequence**

The safety of personnel and aircraft must be the primary consideration when the spotter and pilot select rappel or landing sites. The pilot shall be the final authority on flight procedures. Fire behavior and safety shall also be considered when selecting the site. Before deploying personnel, the spotter shall brief the rappellers on the site selection and fire safety.

1. Pilot flies a high level reconnaissance of the area. The spotter works with the pilot to select an appropriate rappel site, identify hazards and an emergency site.

2. Contact appropriate flight following authority (ATGS, HLCO, dispatch, etc.) prior to commencing the rappel operation. Spotter communicates with flight following authority & pilot regarding number of rappellers to be deployed.
3. Confirm the number of descent devices match the number of rappellers being deployed. When necessary remove and stow unneeded descent devices.
4. Adjust radios as needed to ensure pilot and spotter communication will not be compromised by excessive radio chatter. Radios must remain on and dialed to the appropriate flight following frequency.
5. Where possible helicopter should maintain at least 50 ft. clearance above any obstacles before starting a rappel.
6. If this is not possible and helicopter must descend below the canopy, rotor clearance must meet the current standards in the IHOG.
7. Before starting rappel operations, a HOGE power check is accomplished at an altitude comparable to the rappel site or greater. A Positive rate of climb must be established without exceeding aircraft limitations. Pilot states, "**Hover established, positive rate of climb, power is good.**"
8. Spotter responds, "**Power is good.**"
9. Spotter directs rappellers to unplug and stow ICS communications.

## B. Rappel Sequence

1. Pilot states to spotter, "**1 minute out, airspeed below 40 knots.**"
2. Spotter responds, "**1 minute out, below 40 Knots, coming out of my seatbelt.**"
3. Spotter activates hot mic if not already activated.
4. Spotter states to pilot, "**Opening aircraft door(s).**" Once spotter has opened aircraft doors, spotter states to pilot, "**Reset master caution.**"
5. Pilot responds, "**Master caution reset.**"
6. Spotter/pilot communicate adequate rotor clearance, power assessments, and rappel spot status throughout the rappel sequence using pilot's perspective (left, right, forward, back, and up or down relative to altitude above the ground).

7. Once over the rappel site, spotter states to pilot, **“Ready to drop ropes, how’s the power?”**
8. Pilot confirms power, if within limits; pilot responds to spotter, **“Power good, drop ropes”**.
9. Spotter drops rope outside skid and ensures it is free of knots and rope bag is on the ground. Spotter repeats process for second rope. If the spotter identifies a knot or other problem on the rope, this must be communicated to the rappeller. The rappeller must acknowledge.
10. Spotter states to pilot, **“Rappellers hooking up.”**
11. Pilot responds, **“Hooking up rappellers.”**
12. Spotter then gives **Remove Seatbelt** signal to each rappeller.
13. Rappeller(s) remove seat belt, slide(s) to outboard position on the bench seat, grasp(s) descent device, orient(s), and hook-up and lock-off, places right hand on gunner release and presents hook-up and lock-off to the spotter. Rappeller does not leave seat for this procedure.
14. Spotter confirms the rappellers hook-up and lock-off by visual and tactile inspection.
15. Spotter states to pilot, **“Rappellers to the skids.”**
16. Pilot responds, **“Rappeller(s) to skids.”**
17. Spotter gives **Move into Position** hand signal to each rappeller. Rappeller(s) remove gunner strap, move to the skid, get set, clears rope, returns focus on the spotter. If rappeller identifies a knot or other problem on the rope, this must be communicated to the spotter. The spotter must acknowledge.
18. Spotter states to pilot, **“Ready to send rappeller(s), how’s the power?”**
19. Pilot verifies power. If within limits, pilot responds to spotter, **“Power good, send rappeller(s).”**
20. Spotter responds, **“Sending rappeller(s)”** and gives **Begin Descent** signal to each rappeller.
21. Rappeller(s) unlock, transition over skid, and descend to the ground.

22. Spotter keeps pilot apprised of rappellers' progress down the rope – states to pilot, **“Rappeller(s) off the skid ... half way ... on the ground.”**
23. After reaching the ground, rappeller(s) disconnect from rope(s), and move to a safe area away from the deployment site. Rappeller(s) must use appropriate hand signal to inform spotter if there is a bad rope or rappel site. Spotter will assure that the descent devices are on the ground before sending next set of rappellers or de-rigging ropes.
24. Once rappellers move to a safe area spotter may repeat rappel process from step 10 to deploy additional rappeller(s).
25. Once complete spotter states to pilot, **“De-rigging ropes.”**
26. Spotter states to the pilot, **“Right side/left side rope away, right Side/left Side door shut,”** repeat process for opposite side.
27. Spotter states, **“Clear to depart.”**
28. Pilot responds, **“Clear to depart?”** Spotter states, **“Affirmative, clear to depart.”**
29. The spotter with concurrence from the pilot may initiate the cargo deployment procedures at this time. Pilot may elect to maintain hover or circle until cargo is prepared. See section IV below for cargo deployment procedures.
30. Once rappel and cargo deployment operations are complete, spotter will:
  - a. Return radio to normal operational mode and establish radio contact with ground personnel
  - b. Inform flight following authority that rappel operation has been completed
  - c. Secure loose items in the helicopter
  - d. Fasten any unbuckled seat belts
31. The helicopter shall remain in the area until rappellers have positive communication with dispatch, division, etc.

### C. Rigging Ropes in Flight

After the completion of the first mission and prior to landing, there may be a need to deploy additional rappellers at a different location. In this case ropes and descent devices must be rigged in flight. Remaining rappellers must perform visual check once the spotter completes the rigging process. Once complete, a thumbs-up is exchanged and the rappel sequence will resume at step II, B, 1 above.

## **VI. Post-Rappel**

### **A. Administrative/De-brief**

1. Complete necessary documentation pertinent to the mission.
2. Spotter/pilot will critique the mission and or discuss problems that may have occurred.
3. Upon return of rappellers, spotter and rappellers will critique the mission.

## **VII. Cargo Deployment Procedures**

### **A. Cargo Deployment Procedures**

The deployment of cargo generally occurs as part the rappel operation following the deployment of rappellers. When cargo is deployed as part of the rappel mission, sections B and C below are incorporated in the Pre-Flight procedures in part I above. Sections D and E below provide particular detail not directly addressed in the rappel procedures and should be reviewed and followed.

Cargo may also be deployed independent of the rappel mission for the purpose of resupplying firefighters or supporting other operational missions. The following procedures encapsulate the cargo delivery operation:

### **B. Pre-Flight Procedures for Cargo Deployment Missions**

1. Prior to departure, the pilot(s) and involved personnel shall receive a briefing on mission objectives, communications, known hazards, and emergency procedures.
2. Spotter puts on harness, ensures safety knife is attached to harness
3. Load calculations and manifests complete and posted
4. Spotter completes necessary pre-flight inspections
5. Prior to flight, the spotter must receive a spotter equipment check. When ground personnel are unavailable, the spotter shall have the pilot perform this check. Positive communication between the spotter and pilot must occur to ensure Spotter has attached their tether to an approved hard point.

### C. Rigging and Loading Cargo

1. Spotter will configure Helicopter to meet the needs of the specific cargo mission.
2. Rig cargo with carabiner(s) and secure in helicopter in accordance with section IV, B, of this chapter.
3. Check cargo delivery equipment to ensure proper number of letdown lines, extra carabiners, and figure-8 are available and secured in accessible location.
4. Spotter visually inspects anchor in accordance with the ELAM STC (see Chap. 4, VI, F).
5. Spotter connects tether, plugs into avionics, boards aircraft, and secures seatbelt.
6. Spotter tells pilot, **“Tether attached, OK to depart,”** Pilot Responds **“Tether attached, departing.”**

### D. Pre-Cargo Delivery Sequence

1. Pilot flies a reconnaissance of the area to look for hazards and works with spotter to select an appropriate cargo delivery site.
2. Contact appropriate flight following authority (ATGS, HLCO, dispatch, etc.) prior to commencing the cargo operation. Spotter communicates with flight following authority & pilot regarding number of loads to be deployed.
3. Inform ground personnel to stay clear of cargo during deployment.
4. Adjust radios as needed to ensure pilot and spotter communication will not be compromised by excessive radio chatter. Radios must remain on and dialed to the appropriate flight following frequency.
5. Where possible helicopter should maintain at least 50 ft. clearance above any obstacles before starting a cargo operation.
6. If this is not possible and helicopter must descend below the canopy, rotor clearance must meet the current standards in the IHOG.
7. Before starting cargo operations, A HOGE Power check is accomplished at an altitude comparable to the cargo site or greater. A Positive rate of climb must

be established without exceeding aircraft limitations. Pilot states, **“Hover established, positive rate of climb, power is good.”**

8. Spotter responds, **“Power is Good”**
9. Spotter activates hot mic if not already activated
10. If not performed on the ground, spotter rigs Figure-8 with cargo letdown line and attaches figure-8 using one (1) carabiner in anchor bracket, barrel down, gate facing inboard. Attach end of letdown line to cargo with SMC Lite Stainless Steel Locking carabiner. Lock carabiner.
11. Cargo letdown pack must be connected to a hard-point in aircraft.
12. Spotter removes restraining straps from cargo, ensure remaining cargo is secure, and positions cargo in doorway. Spotter relays to pilot when rigging is complete.
13. Pilot reduces forward airspeed on approach to cargo delivery site, the pilot states to spotter, **“Below 40 knots, moving into cargo delivery site.”**
14. Spotter states to pilot, **“Opening aircraft door(s).”** Once spotter has opened aircraft door, spotter states to pilot, **“Reset master caution”**.
15. Pilot responds, **“Master Caution Reset.”**

#### **E. Cargo Deployment Sequence**

1. Spotter/pilot communicate adequate rotor clearance, power assessments, and cargo delivery spot status throughout the operation using pilot’s perspective (left, right, forward, back, and up or down relative to altitude above the ground).
2. Once established over the cargo delivery spot, spotter states to pilot, **“Cargo ready, how’s the power?”**
3. Pilot confirms power. If within limits, pilot responds to spotter **“Powers good, send cargo.”**
4. Spotter states to pilot, **“Sending cargo”**, then eases cargo out the door, over the flight step and skid.
5. Begin lowering cargo with positive control of letdown line; do not allow un-arrested descent of cargo. Spotter keeps pilot informed of actions and



progress of cargo descent, **“Cargo out the door ... halfway down ... cargo on the ground”**.

6. When cargo is on the ground, unhook figure-8 from carabiner or door bracket and remove letdown line. Hold slack in line to prevent billowing and unhook letdown line bag from hard-point. Wrap excess letdown line around bag and throw clear of aircraft.
7. Inform pilot if more cargo is to be lowered. Pilot/spotter will determine whether to hold hover or orbit area until cargo is ready for subsequent deployment.
8. When cargo deployment is complete spotter states to pilot, **“Lines are away, clear to depart.”**
9. Pilot responds, **“Lines away, clear to depart.”**
10. Spotter states, **“Affirmative, lines are clear, clear to depart.”**
11. Spotter closes doors (if necessary), returns to seat and fastens seatbelt.
12. Radio returned to normal operational mode and flight following authority is informed that cargo operation has been completed.

## VIII. Hand Signals

The following standard hand signals shall be used:

### A. Thumbs-Up

Used by rappellers and spotters to indicate, "I agree" or "I am O.K".



### B. Remove Seatbelt

Imitate removing lap belt – spotter gives signal to each rappeller.



### C. Move Into Position

Hands clasped at chest level with elbows out - signal given by spotter to rappellers to direct movement to pre-rappel position.



### D. Begin Descent

Arm(s) extended with open palms down, sweeping downward motion – signal given by spotter to rappeller(s) directing rappeller(s) to unlock and begin rappel.

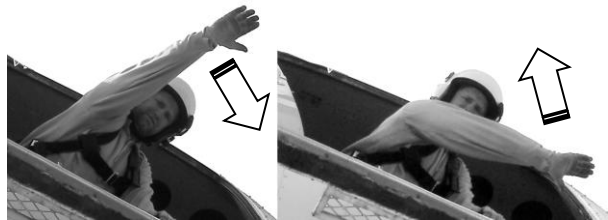


**E. Spread Eagle**

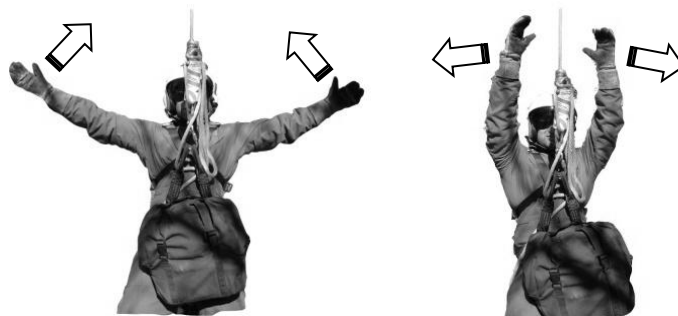
Arms and legs outstretched while looking up to establish eye contact with spotter – signal given by rappeller to spotter to indicate that rappeller has locked-off and further descent is not possible.

**F. Begin ETO**

Horizontal arm wave with outstretched arm – signal given by spotter to rappeller after rappeller has given spread eagle signal – signal indicates that rappeller should tie-off and cut rope below him/her and prepare to be lifted out.

**G. Lift-Out**

Upward motion with outstretched arms – signal given by rappeller to spotter to indicate that rope below rappeller has been cut and rappeller is ready to be lifted up. Signal is given until rappeller and rope are raised above all surrounding obstacles.

**H. Clear to Flyaway**

Both arms extended to front of body with palms together – signal given by rappeller during lift-out and flyaway indicating that rappeller is clear of obstacles and pilot can begin forward flight.



**I. Bad Rope**

With one arm outstretched, slashing motion across outstretched arm with other arm – signal given by rappeller to spotter to indicate there is something wrong with the rope and spotter should drop it.

**J. Discontinue Rappel**

Slashing motion across throat with one arm – signal given by rappeller to spotter indicating bad rappel site, discontinue rappel.

**K. Stop, Hold Position**

Arm(s) extended toward signal recipient with fist clenched (palm toward recipient) – signal given normally by spotter to rappeller(s) to stop and hold rappeller(s) in position prior to the “begin descent” signal.

**L. Knot**

Finger pointing down the rope – signal by spotter or rappeller indicating a knot in a deployed rope – this signal must be acknowledged by a head nod.



**M. Return to Seat**

Give "Stop, Hold Position" signal [arm(s) extended, fist(s) clenched], then bring fists and elbows together [arms bent 90° and fist(s) in front of body] – signal given by spotter to indicate rappeller(s) should return to seat and buckle seat belt.

**N. Communication Lost**

Single clenched fist – spotter will signal to pilot loss of communication with a shoulder tap and presentation of a single clenched fist – When ready to depart, spotter will signal to pilot with a shoulder tap and thumbs-up.





## Chapter 6 – Rappel and Cargo Operations Emergency Procedures

### I. Rappeller Emergency Procedures and Signals

Emergency Procedures are defined as established methods prescribed to respond to a situation, serious in nature, developing suddenly or unexpectedly, and demanding immediate action.

#### A. Rappeller Emergency Tie-Off (ETO) Procedure

1. If during a rappel the rappeller encounters a problem that will hinder their progress to the ground, the rappeller will attempt to clear the problem. The rappeller may initiate a Lock-Off to facilitate using both hands to correct the problem. If a Lock-off has been initiated, and the rappeller still cannot resolve the problem, the rappeller will return their attention to the spotter and give the **Spread-Eagle** Signal. If the spotter gives the **Begin ETO** signal (horizontal arm wave), the rappeller will initiate an Emergency Tie-Off (ETO) and cut the rope below. If no ETO signal is given, the rappeller will be lowered to the ground (see Chap. 5 for hand signal descriptions).
2. ETO is a procedure completed after locking-off, to permanently secure the rappeller's position on the rope. Some situations when a tie-off may be required are:
  - a. The rope becomes entangled, preventing the rappeller from descending or creates a hazard to the helicopter.
  - b. The rappeller cannot descend because of pitch (sap) on the rope.
  - c. A knot on the rope has become lodged in the descent device.
  - d. The rappeller has a descent device malfunction.
3. When a problem occurs and the helicopter has insufficient clearance from obstacles to lower rappeller to ground or; there is a problem with rappel site/landing area; the spotter will signal the rappeller to begin the ETO procedure.
4. The ETO procedure is as follows:
  - a. Bring running end of rappel rope through the harness between the webbing and rappeller's body from right to left where the descent device is attached. Pull up three to four feet of slack to form a running loop.
  - b. Bring loop up and over descent device in a clockwise direction going behind the rappel rope and form a half-hitch around the fixed-end (to helicopter) of rope. Pull half-hitch tight.
  - c. Form another half-hitch on top of the first one. Pull tight. A 6 – 12 inch looped tail should remain.

- d. Move rope to left side of body and cut the running end of rope approximately four to six feet below the descent device.
- e. After the rope has been cut, the rappeller gives the spotter the **Lift-Out** signal. This indicates to the spotter that the rope has been cut and that the helicopter should climb until the rappeller is clear of obstacles. After all obstacles have been cleared, the rappeller will indicate this with the **Clear to Flyaway** signal. Then, the helicopter transports rappeller to a safe landing site. Upon arriving at a safe landing site, the rappeller is lowered to the ground.
- f. Once on the ground the rappeller shall wait for slack in the rope preventing possible snap back toward helicopter rotors. Then remove raptor knife and cut the rappel rope above the half-hitches.

## B. Rappeller in Distress

1. Descent Arrest: The rappeller may, in an effort to apply additional friction during a rapid descent, move the right hand with rope around to the back of the body in an attempt to use the added friction of the clothing to assist braking.

A rappeller on the ground may slow the descent of a rappeller on a rope by pulling directly down on the rope. This procedure is called belaying.

2. Problems after Rappel: For operations where multiple rappellers are deployed from a single rope, procedures are in place to allow the first rappellers to the ground to signal problem to the spotter.
  - a. If a rope defect or problem is evident, the rappeller(s) will give the **Bad Rope** signal by making slashing arm motion across other arm, indicating to the spotter the rope is unsafe and it should be dropped and the mission completed with a new rope.
  - b. If a rappeller on the ground recognizes the rappel site is a safety problem, the rappeller will give the **Discontinue Rappel** signal by slashing arm across throat to indicate to the spotter that site is unacceptable so the rope may be dropped and another location can be selected.



## II. In-Flight Emergencies

**NOTE:** There are many circumstances that can constitute an in-flight emergency. Pilots, spotters and rappellers must understand that the consequences of an emergency change significantly once rappellers are committed to the rope. It is extremely important for a pilot and spotter to have a firm understanding of the situation and discuss up front as many circumstances as possible prior to operations. In the midst of an emergency is NOT the appropriate time and place to discover that, “What you heard is not what I meant.” This should be accomplished through briefings and on-ground emergency exercises.

### A. Emergency Communications and Categories

In the rappel environment, clear and concise communication culminating in a coordinated response between the spotter and pilot is critical to a successful outcome.

1. During rappel operations, there are two basic categories of in-flight emergencies:
  - a. Those that require an **immediate** response (Land as Soon as Possible)
  - b. Those that permit a **delayed** response (Land as Soon as Practicable)

### B. Immediate Response Emergencies (Land as Soon as Possible)

There are a limited number of emergencies that fall into this category. In the rappel environment these emergencies are characterized by a need to depart the rappel hover without delay. In this type of emergency, the possibility of affecting a positive outcome will be impacted by the ability to jettison ropes quickly.

1. Examples of Possible Emergencies:
  - a. Engine Failure
  - b. Tail Rotor Failure
  - c. Hard-over of controls
  - d. Engine over speed/driveshaft failure
  - e. Compressor Stall (Single engine)
  - f. Governor Failure Low Side (Twin Engine)
  - g. Governor Failure (Single Engine)

### C. Delayed Response Emergencies (Land as Soon as Practicable)

There are any numbers of events, typically mechanical or environmental, that fall into this category. In the rappel environment, these events are characterized by an ability to delay the departure from the rappel hover. In events of this nature there is typically time to complete a rappel or cargo deployment prior to departing the hover.

1. Examples of Possible Problems:
  - a. Transmission/Engine/Tail Rotor Gear Box Chip Light
  - b. Hydraulic Failure
  - c. Oil temp/Oil pressure light
  - d. Hydraulic temp or pressure light
  - e. Unknown Master Caution
  - f. Fire light (require pilot check of controls and for fire on board)
  - g. Stuck pedal
  - h. Fuel control or governor failure high side (Twin Engine)
  - i. Electrical failure
  - j. Fuel/air filter clog
  - k. Fuel pump failure
  - l. Decrease in rotor RPM
  - m. Compressor Stall (twin engine)
  - n. Severe up or down drafts

**NOTE:** These procedures note delayed responses and may not require immediate action other than communication and monitoring – response actions can vary in time from seconds to minutes.

### III. Pilot and Spotter Actions – Rappel Operations

#### A. Rappel Immediate Response Actions

1. See TABLE 6-1 on the next page for Pilot and Spotter actions during an in-flight emergency requiring an immediate response.

**NOTE:** The “Abort, Abort” and the subsequent actions taken by the pilot and spotter will occur almost simultaneously. Pilot, will attempt to gain forward flight, if possible, which will require that the spotter clear ropes without hesitation. The pilot is not expected to wait for the “Clear” from the spotter before taking action to appropriately respond to the emergency. Any failure to immediately clear the aircraft of ropes may pose a threat to the aircraft and personnel onboard, as well as increase the risk to rappeller(s) on the rope(s).

<b>Rappel - Immediate Response (Land as Soon as Possible)</b>			
<b>PILOT DUTIES</b>			
It is imperative that pilots diagnose this emergency accurately without delay. Additionally pilot must simultaneously alert the spotter by stating " <b>ABORT, ABORT</b> ".			
<b>SPOTTER DUTIES</b>			
Spotter's response must be immediate; however actions will vary depending on the phase of rappel when the emergency occurs. It is critical spotters understand the sequence.			
PHASE OF RAPPEL		<b>PILOT STATES</b>	<b>SPOTTER ACTION/RESPONSE</b>
	RAPPELLERS SECURE, ROPES SECURE	<b>"ABORT, ABORT"</b>	STATE " <b>CLEAR</b> ", IMMEDIATELY TAKE SEAT AND FASTEN SEAT BELT. <b>SPOTTER:</b> DOORS AND OTHER CABIN DUTIES SHOULD NOT TAKE PRIORITY OVER GETTING TO A SEAT AND INTO A SEAT BELT. <b>RAPPELLERS:</b> SECURE ROPE BAGS DUE TO CABIN DOORS REMAINING OPEN THROUGHOUT DESCENT AND LANDINGS
	RAPPELLERS SECURE, ROPE(S) DEPLOYED	<b>"ABORT, ABORT"</b>	<b>CUT ROPE(S)</b> BELOW BOTTOM DESCENT DEVICE(S), STATE " <b>CLEAR</b> ", IMMEDIATELY TAKE SEAT AND FASTEN SEAT BELT. <b>SPOTTER:</b> DOORS AND OTHER CABIN DUTIES SHOULD NOT TAKE PRIORITY OVER GETTING TO A SEAT AND INTO A SEAT BELT
	RAPPELLERS OUT OF SEAT BELTS, ROPES DEPLOYED	<b>"ABORT, ABORT"</b>	GIVE RAPPELLERS <b>RETURN TO SEAT</b> SIGNAL, <b>CUT ROPES</b> BELOW BOTTOM DESCENT DEVICES, STATE " <b>CLEAR</b> ", IMMEDIATELY TAKE SEAT AND FASTEN SEAT BELT
	RAPPELLERS ON SKIDS	<b>"ABORT, ABORT"</b>	GIVE RAPPELLERS <b>RETURN TO SEAT</b> SIGNAL, <b>CUT ROPES</b> BELOW BOTTOM DESCENT DEVICES, STATE " <b>CLEAR</b> ", IMMEDIATELY TAKE SEAT AND FASTEN SEAT BELT
	RAPPELLERS IN DESCENT (OFF SKIDS)	<b>"ABORT, ABORT"</b>	<b>CONFIRMS THE EMERGENCY</b> , <i>(either by the obvious flight profile of the aircraft or by challenge and response with the pilot)</i> , <b>CUT ROPES</b> AT ANCHOR BELOW SWAGES, <u>OR</u> BELOW DESCENT DEVICES <i>(one set of rappellers still in the aircraft)</i> , STATE " <b>CLEAR</b> ", IMMEDIATELY TAKE SEAT AND FASTEN SEAT BELT. <b>SPOTTERS:</b> UNNECESSARY DELAY MAY RESULT IN A CATASTROPHIC OUTCOME FOR AIRCRAFT AND CREW
	RAPPEL COMPLETE, DERIGGING AIRCRAFT	<b>"ABORT, ABORT"</b>	<b>CUT ROPES</b> AT ANCHOR BELOW SWAGES <u>OR</u> BELOW DESCENT DEVICES, <i>(one set of rappellers still in aircraft)</i> , STATE " <b>CLEAR</b> ", IMMEDIATELY TAKE SEAT AND FASTEN SEAT BELT. <b>SPOTTERS:</b> DOORS AND OTHER CABIN DUTIES SHOULD NOT TAKE PRIORITY OVER GETTING TO A SEAT AND INTO A SEAT BELT

TABLE 6-1

**B. Rappel Delayed Response Actions**

1. See TABLE 6-2 on the next page for Pilot and Spotter actions during an in-flight emergency or situation that may be addressed through a delayed response.

**NOTE:** Events of an environmental nature may be resolved by waiting for the event to subside or relocating to an alternate rappel site. An event of this nature requires that the pilot inform the spotter of the actions required to address the event. If at any point continued flight is hazardous due to environmental conditions, the pilot will state "Expedite, Expedite".

## Rappel - Delayed Response (Land As Soon As Practicable)

### PILOT DUTIES

When experiencing a delayed response emergency, **"EXPEDITE, EXPEDITE"**, is intended as the initial alert for the crew communicating that the rappel must be halted due to an aircraft malfunction or environmental condition. It should not be the only communication passed. As the situation allows the pilot should advise the crew of the aircraft status and the intended duration of the flight. It must be understood if rappellers have left the skids the aircraft will remain stable until the rappel is complete and ropes have been cut.

### SPOTTER DUTIES

Unnecessary delays should be avoided due to the critical nature of the flight profile. The only time there should be excessive delay is when rappellers are in the descent, the spotter should advise the pilot as to the amount of time needed to get the rappellers on the ground and cut ropes.

PHASE OF RAPPEL		PILOT STATES	SPOTTER ACTION/RESPONSE
	RAPPELLERS SECURE, ROPES SECURE	<b>"EXPEDITE, EXPEDITE"</b>	STATE <b>"CLEAR"</b> , CLOSE AIRCRAFT DOORS, TAKE SEAT AND FASTEN SEAT BELT
	RAPPELLERS SECURE, ROPE(S) DEPLOYED	<b>"EXPEDITE, EXPEDITE"</b>	<b>CUT ROPE(S)</b> BELOW BOTTOM DESCENT DEVICE(S), VISUALLY VERIFY ROPES ARE CLEAR OF SKIDS, STATE <b>"CLEAR"</b> , CLOSE AIRCRAFT DOORS, TAKE SEAT AND FASTEN SEAT BELT
	RAPPELERS OUT OF SEAT BELTS, ROPES DEPLOYED	<b>"EXPEDITE, EXPEDITE"</b>	GIVE RAPPELLERS <b>RETURN TO SEAT</b> SIGNAL, ONCE RAPPELLERS ARE IN SEAT BELTS, <b>CUT ROPES</b> BELOW BOTTOM DESCENT DEVICES, VISUALLY VERIFY ROPES ARE CLEAR OF SKIDS, STATE <b>"CLEAR"</b> , CLOSE AIRCRAFT DOORS, TAKE SEAT AND FASTEN SEAT BELT
	RAPPELLERS ON SKIDS	<b>"EXPEDITE, EXPEDITE"</b>	GIVE RAPPELLERS <b>RETURN TO SEAT</b> SIGNAL, ONCE RAPPELLERS ARE IN SEAT BELTS, <b>CUT ROPES</b> BELOW BOTTOM DESCENT DEVICES, VISUALLY VERIFY ROPES ARE CLEAR OF SKIDS, STATE <b>"CLEAR"</b> , CLOSE AIRCRAFT DOORS, TAKE SEAT AND FASTEN SEAT BELT
	RAPPELLERS IN DESCENT (OFF SKIDS)	<b>"EXPEDITE, EXPEDITE"</b>	<b>CONFIRM EMERGENCY/PROBLEM</b> , DISCUSS THE PROGRESS OF THE RAPPEL WITH THE PILOT, ONCE RAPPELLERS ARE ON THE GROUND, <b>CUT ROPES</b> AT ANCHOR BELOW SWAGES <u>OR</u> BELOW DESCENT DEVICES, <i>(one set of rappellers still in aircraft)</i> , VISUALLY VERIFY ROPES ARE CLEAR OF SKIDS, STATE <b>"CLEAR"</b> , CLOSE AIRCRAFT DOORS, TAKE SEAT AND FASTEN SEAT BELT
	RAPPEL COMPLETE, DERIGGING AIRCRAFT	<b>"EXPEDITE, EXPEDITE"</b>	<b>CUT ROPES</b> AT ANCHOR BELOW SWAGES <u>OR</u> BELOW DESCENT DEVICES, <i>(one set of rappellers still in aircraft)</i> , VISUALLY VERIFY ROPES ARE CLEAR OF SKIDS, STATE <b>"CLEAR"</b> , CLOSE AIRCRAFT DOORS, TAKE SEAT AND FASTEN SEAT BELT

TABLE 6-2

## IV. Pilot and Spotter Actions – Cargo Deployment Operations

### A. Cargo Deployment Immediate Response Actions

1. See TABLE 6-3 below for Pilot and Spotter actions during an in-flight emergency requiring an immediate response.

<b>Cargo Delivery - Immediate Response (Land As Soon As Possible)</b>			
<b>PILOT DUTIES</b>			
It is imperative that pilots diagnose this emergency accurately without delay. Additionally they must simultaneously alert the spotter by stating " <b>ABORT, ABORT</b> ".			
<b>SPOTTER DUTIES</b>			
Spotter's response must be immediate; however actions will vary depending on the phase of rappel when the emergency occurs. It is critical spotters understand the sequence.			
<b>PHASE OF CARGO LETDOWN</b>		<b>PILOT STATES</b>	<b>SPOTTER ACTION/RESPONSE</b>
	CARGO SECURE	<b>"ABORT, ABORT"</b>	STATE " <b>CLEAR</b> ", IMMEDIATELY TAKE SEAT AND FASTEN SEAT BELT. <b>SPOTTER:</b> DOORS AND OTHER CABIN DUTIES SHOULD NOT TAKE PRIORITY OVER GETTING TO A SEAT AND INTO A SEAT BELT
	CARGO UNSECURE INSIDE AIRCRAFT	<b>"ABORT, ABORT"</b>	<b>RE-SECURE CARGO, OR CUT LINE</b> DIRECTLY ABOVE CONTAINER AND JETTISON CARGO OUT OPEN DOOR. STATE " <b>CLEAR</b> ", IMMEDIATELY TAKE SEAT AND FASTEN SEAT BELT. <b>SPOTTER:</b> DOORS AND OTHER CABIN DUTIES SHOULD NOT TAKE PRIORITY OVER GETTING TO A SEAT AND INTO A SEAT BELT
	CARGO UNSECURE OUTSIDE AIRCRAFT	<b>"ABORT, ABORT"</b>	<b>CUT LINE</b> , STATE " <b>CLEAR</b> ", IMMEDIATELY TAKE SEAT AND FASTEN SEAT BELT

TABLE 6-3

## B. Cargo Deployment Delayed Response Actions

1. See TABLE 6-4 below for Pilot and Spotter actions during an in-flight emergency or situation that may be addressed through a delayed response.

<b>Cargo Delivery – Delayed Response (Land As Soon As Practicable)</b>			
<p align="center"><b>PILOT DUTIES</b></p> <p>When experiencing this type of emergency, <b>“EXPEDITE, EXPEDITE”</b> is intended as the initial alert for the crew communicating that the cargo deployment must be curtailed due to an aircraft malfunction or environmental condition. Communication shall not be limited and pilot should advise the crew of the status of the aircraft and the intended duration of the flight.</p>			
<p align="center"><b>SPOTTER DUTIES</b></p> <p>Unnecessary delays should be avoided due to the critical nature of the flight profile. The only time there should be any delay is during the cargo deployment sequence. If there is to be a delay, the spotter should advise the pilot as to the amount of time needed to get the cargo on the ground and cut line.</p>			
<b>PHASE OF CARGO LETDOWN</b>		<b>PILOT STATES</b>	<b>SPOTTER ACTION/RESPONSE</b>
	CARGO SECURE	<b>“EXPEDITE, EXPEDITE”</b>	STATE <b>“CLEAR”</b> , CLOSE AIRCRAFT DOORS, TAKE SEAT AND FASTEN SEAT BELT
	CARGO UNSECURE INSIDE AIRCRAFT	<b>“EXPEDITE, EXPEDITE”</b>	SECURE CARGO, STATE <b>“CLEAR”</b> , CLOSE AIRCRAFT DOORS, TAKE SEAT AND FASTEN SEAT BELT
	CARGO UNSECURE OUTSIDE AIRCRAFT	<b>“EXPEDITE, EXPEDITE”</b>	COMPLETE CARGO DEPLOYMENT, <b>CUT LINE</b> , STATE <b>“CLEAR”</b> , CLOSE AIRCRAFT DOORS, TAKE SEAT AND FASTEN SEAT BELT

TABLE 6-4





## Chapter 7 – Documentation

### I. Records and Reports - General

Record keeping is mandatory for administering rappel operations. Accurate records and reports on rappel activities, equipment use, training, and injury statistics shall be maintained.

All rappel logs are official documents and will be kept on the forms contained in Appendix C or electronic equivalent. Rappel logs will be archived for a minimum of seven (7) years.

All rappel equipment that is removed from service (retired) must be destroyed to the point that it can no longer be utilized for its intended purpose. Any equipment that requires documentation must show retirement date on the “Equipment Log” when removed from service.

#### A. Unit Records

Each unit shall maintain records documenting training for rappellers and spotters and records documenting the use and inspection of specified equipment. The forms for documenting training, and certification of personnel and tracking the equipment are found in Appendix C of this Guide. See sections II and III below for specific information and requirements for each record.

**NOTE: All electronic records should be backed up to an external drive or server. A hard copy of electronic record will be printed at least once annually.**

#### B. Fire Experience and Fire Training Records

Fire related records shall be maintained on all individuals at each unit in accordance with agency requirements.

#### C. Rappel Injury Reporting

All rappel related injuries, in addition to being reported through established local protocols, will be reported through the local Helicopter Operations Specialist and forwarded to the National Rappel Specialist.

### II. Training, Certification, and Proficiency Records

**NOTE: Copies of certifying and recertifying documentation will be maintained in individual permanent records and forwarded to the IQCS Account Manager.**

**A. Rappel Unit Log**

All rappels, spots, and related information must be entered into a Rappel Unit Log found in Appendix C (Form C-5) or electronic equivalent and shall be readily available for review. The spotter or rappel base manager will ensure information is entered into the logs in a timely manner and the logs are kept current.

**B. Rappeller Training Records**

The Rappeller Training Record for initial training and recertification of rappellers shall document each individual step in the training. Competency at each level of the training must be demonstrated by the trainee before the spotter shall permit advancement to the next step (see Forms C-6 and C-7, Appendix C). Each rappeller will maintain a record of training, proficiency and operational rappels in the Rappel Unit Log.

**C. Spotter Training Records**

The Helicopter Spotter Training Record for returning spotters and Qualification Record for initial training shall document each individual step in the training. Competency at each level of the training must be demonstrated by the trainee before the spotter shall permit advancement to the next step (see Forms C-8 and C-9, Appendix C). Each spotter will maintain a record of training, proficiency and operational spots of rappellers and cargo in the Rappel Unit Log.

**III. Equipment Master Records**

All equipment requiring documentation will be assigned a unique identification number. The number will be retired with the piece of equipment. The following equipment shall have a log assigned (see Appendix C).

**A. Cargo Letdown Line Log**

All cargo letdown line use shall be documented. After inspection, any irregularities will be noted. Use the Cargo Letdown Line Log from Appendix C (Form C-1) or electronic equivalent.

**B. Harness Log**

Harness will be inspected annually and after each use. Inspections shall be documented in the harness log. Pre-use inspection and buddy checks do not need to be documented. Any deficiencies during pre-use inspections, repairs and/or component replacement will be noted. The harness log form in Appendix C (Form C-2) or electronic equivalent must be used for harness documentation.

**C. Descent Device Log**

Use and inspection of any descent device shall be documented on a Descent device log. Cover and shaft shall have the same identification number and shall always be used together. Numbers shall be engraved according to Chapter 4, Rappel and

Cargo Letdown Equipment. After each rappel, the descent device shall be inspected for wear or deformity and remarks noted. When a rappel device is retired, it shall be destroyed to eliminate further use. Use Descent Device Log from Appendix C (Form C-3) or electronic equivalent.

**D. Rappel Rope Log**

Documentation must be maintained for all rappel ropes. A log shall be maintained from the date of purchase until the rope is removed from service. The rope log shall be readily available for review. Each rope must have an identification number and be marked at both ends, one end marked "A" and the other end marked "B" (reference Chapter 4 Rappel Equipment).

All rope uses shall be documented. After inspection, any irregularities will be noted and brought to the attention of the spotter. Documented information will dictate when to retire a rope from service. Use Rappel Rope Log in Appendix C (Form C-4) or electronic equivalent.

**E. Rappel Tower Anchor**

Use and inspection of rappel tower anchors shall be documented. Example forms are located in Appendix C (Form C-11). Bases may use other forms, provided the forms provide at a minimum the information listed below:

1. Date put in service
2. ID number
3. Remarks/problems
4. Type of use (Helicopter or tower)
5. Inspector's name and date inspected